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Mathematics

Grade 12 (Advanced Level)

REVIEW INSTRUMENTS

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MATHEMATICS

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1989-1990

PRINCIPAL QUESTIONNAIRE

Provincial Reviews
Mathematics

Grade 8
Grade 10, General Level
Grade 12, Advanced Level

PROVINCIAL REVIEWS

Ministry of Education
Program Implementation and Review Branch

MATHEMATICS

PRINCIPAL QUESTIONNAIRE

This questionnaire has been designed to collect information for the Provincial Reviews of Mathematics in the Intermediate and Senior Divisions. It will cover Mathematics for Grade 8; Grade 10, General Level; and Grade 12, Advanced Level. You are asked to respond to the questions relating only to the grade(s) in your school that are included in the review.

We have tried to limit the questions to those we consider important in order to minimize the time required to complete the questionnaire. ***It may be necessary for you to consult with teachers or the department head for some questions.***

Please answer these questions directly on the questionnaire. Return it, when completed, by mail directly to the Ministry of Education in the enclosed stamped pre-addressed envelope by ***February 24, 1990****.*

No information will be published or made available which will allow the identification of any individual school principal.

If you have questions please call your local Provincial Review Coordinator for the Provincial Reviews at your local regional office of the Ministry of Education.

Thank you for your cooperation.

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PRINCIPAL QUESTIONNAIRE

1989-1990
Provincial Reviews

For questions 1 to 5, write your answers in the boxes provided.

1. **How many students are enrolled in your school?** (Thousands, Hundreds, Tens, Ones) — 21–24

2. **How many students are enrolled in Grade 8 Mathematics?** *(Include both semesters if applicable.)* — 25–28

3. **How many students are enrolled in the following in your school?** *(Include both semesters if applicable.)*

   Grade 10 Mathematics, Basic, General and Advanced Levels — 29–32

   Grade 10 Mathematics, General Level only — 33–36

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4. **How many students are enrolled in the following in your school?** *(Include both semesters if applicable.)*

   (Thousands, Hundreds, Tens, Ones)

   Grade 12 Mathematics, Basic, General and Advanced Levels — 37–40

   Grade 12 Mathematics, Advanced Level only — 41–44

5. **What is the time allocation for mathematics instruction in your school?**

   (Hundreds, Tens, Ones)

   Number of hours per course per year - **Grade 8** — 45–47

   Number of hours per course per year - **Grade 10, General Level** — 48–50

   Number of hours per course per year - **Grade 12, Advanced Level** — 51–53

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Answer the following questions by circling the number that corresponds to your response for the appropriate grade level(s).

6. **Which of the following best describes the community served by your school?**

Urban/Suburban area	1	
Rural area	2	54
Isolated area	3	

7. **Which of the following applies to the scheduling of your mathematics program?**

	Full Year	Semestered	Other	
Grade 8	1	2	3	55
Grade 10, General Level	1	2	3	56
Grade 12, Advanced Level	1	2	3	57

	YES	NO	
8a) **Is there an Immersion French/Extended French program in your school?** Questions 8a and 8b do not apply to French-language schools.	1	2	58

(If NO, go to Question 9.)

8b) **If YES, which of the following mathematics courses are taught in French?**

	YES	NO	
Grade 8 Mathematics	1	2	59
Grade 10 Mathematics, General Level	1	2	60
Grade 12 Mathematics, Advanced Level	1	2	61

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9. About how often do teachers in your school meet for the purpose of discussing the teaching of mathematics?

Grade 8

Once every week	1	
Once every two or three weeks	2	
Once every month or second month	3	62
Fewer than 5 times per year	4	
Never	5	

Grade 10, General Level

Once every week	1	
Once every two or three weeks	2	
Once every month or second month	3	63
Fewer than 5 times per year	4	
Never	5	

Grade 12, Advanced Level

Once every week	1	
Once every two or three weeks	2	
Once every month or second month	3	64
Fewer than 5 times per year	4	
Never	5	

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10. How much emphasis is placed on the following planning documents for mathematics?

Grade 8	None	Some	A lot	
Ministry of Education guidelines	1	2	3	65
School board documents	1	2	3	66
School-level planning documents/course of study	1	2	3	67

Grade 10, General Level	None	Some	A lot	
Ministry of Education guidelines	1	2	3	68
School board documents	1	2	3	69
School-level planning documents/course of study	1	2	3	70

Grade 12, Advanced Level	None	Some	A lot	
Ministry of Education guidelines	1	2	3	71
School board documents	1	2	3	72
School-level planning documents/course of study	1	2	3	73

	YES	NO	
11. Does your school board have a procedure for regularly reviewing mathematics programs?	1	2	74

	YES	NO	
12. Does your school have a procedure for regularly reviewing mathematics programs?	1	2	75

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13. When was the mathematics program last reviewed by either the school or the school board?

Grade 8

Has not occurred	1	
Last school year (1988-89)	2	
Two to four years ago	3	76
Five years or more	4	

Grade 10, General Level

Has not occurred	1	
Last school year (1988-89)	2	
Two to four years ago	3	77
Five years or more	4	

Grade 12, Advanced Level

Has not occurred	1	
Last school year (1988-89)	2	
Two to four years ago	3	78
Five years or more	4	

(If a mathematics review has NOT occurred, go to Question 16.)

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14. If a mathematics review was conducted, which of the following components did it include?

Grade 8	YES	NO	
Review of planning documents	1	2	79
Review of teaching practices	1	2	80
Review of evaluation practices in schools	1	2	81
Review of resources	1	2	82
Administration of achievement test	1	2	83

Grade 10, General Level	YES	NO	
Review of planning documents	1	2	84
Review of teaching practices	1	2	85
Review of evaluation practices in schools	1	2	86
Review of resources	1	2	87
Administration of achievement test	1	2	88

Grade 12, Advanced Level	YES	NO	
Review of planning documents	1	2	89
Review of teaching practices	1	2	90
Review of evaluation practices in schools	1	2	91
Review of resources	1	2	92
Administration of achievement test	1	2	93

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15. What changes occurred as a result of the last review of the mathematics program?

Grade 8 There was a change in:	YES	NO	
Teaching objectives	1	2	94
Sequence and timing of programs	1	2	95
Teaching strategies	1	2	96
Student evaluation practices	1	2	97
School resources	1	2	98

Grade 10, General Level There was a change in:	YES	NO	
Teaching objectives	1	2	99
Sequence and timing of programs	1	2	100
Teaching strategies	1	2	101
Student evaluation practices	1	2	102
School resources	1	2	103

Grade 12, Advanced Level There was a change in:	YES	NO	
Teaching objectives	1	2	104
Sequence and timing of programs	1	2	105
Teaching strategies	1	2	106
Student evaluation practices	1	2	107
School resources	1	2	108

16. Outside of regular professional development days, what activities or courses do teachers in your school engage in for the purpose of professional development for the teaching of mathematics?

			For Ministry Use Only
Grade 8	YES	NO	
Seminars/workshops	1	2	109
Visiting other classrooms	1	2	110
Conferences	1	2	111
Peer coaching/Job shadowing	1	2	112
Credit courses	1	2	113
Professional Reading	1	2	114
Grade 10, General Level	YES	NO	
Seminars/workshops	1	2	115
Visiting other classrooms	1	2	116
Conferences	1	2	117
Peer coaching/Job shadowing	1	2	118
Credit courses	1	2	119
Professional Reading	1	2	120
Grade 12, Advanced Level	YES	NO	
Seminars/workshops	1	2	121
Visiting other classrooms	1	2	122
Conferences	1	2	123
Peer coaching/Job shadowing	1	2	124
Credit courses	1	2	125
Professional Reading	1	2	126

Thank you for your cooperation in completing this questionnaire.

*Please mail it back to the Ministry of Education in the stamped pre-addressed envelope by **February 24, 1990.***

1989-1990

TEACHER QUESTIONNAIRE

Provincial Review
Mathematics
Grade 12, Advanced Level

PROVINCIAL REVIEWS

Ministry of Education
Program Implementation and Review Branch

MATHEMATICS

TEACHER QUESTIONNAIRE

This questionnaire has been designed to collect information for the Provincial Review of Mathematics in the Senior Division. ***It will cover the Grade 12 Mathematics, Advanced Level program.***

We have tried to limit the questions to those we consider important in order to minimize the time required to complete the questionnaire.

Please answer these questions directly on the questionnaire. Return it, when completed, by mail directly to the Ministry of Education in the enclosed stamped pre-addressed envelope by ***February 24, 1990****.*

No information will be published or made available which will allow the identification of any individual teacher.

If you have questions please call the Provincial Review Coordinator for Provincial Reviews at your local regional office of the Ministry of Education.

Thank you for your cooperation.

TEACHER QUESTIONNAIRE

Please answer each question by making a circle around the number that corresponds to your response.

SECTION I: PERSONAL/PROFESSIONAL BACKGROUND

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1. Are you male or female?

Male	1	21
Female	2	

2. How many years full-time teaching experience do you have? *(Include the current year and round to the nearest year any part-time experiences you have.)*

1 year	1	22
2 to 5 years	2	
6 to 10 years	3	
11 or more years	4	

3. How many years have you spent teaching mathematics? *(Include the current year and round to the nearest year any part-time experiences you have.)*

	Elementary	Secondary	
1 year	1	1	23 Elem
2 to 5 years	2	2	
6 to 10 years	3	3	24 Sec
11 or more years	4	4	

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4. How many full-year courses in mathematics methods were included in your teacher education?

No course in mathematics methods	1	25
Some instruction as part of a general course	2	
One full course in mathematics methods	3	
Two or more full courses in mathematics methods	4	

5. How many full-year university courses do you have in mathematics?

Zero	0	26
One	1	
Two	2	
Three	3	
Four	4	
Five or more	5	

6. How many courses in measurement and evaluation or testing were included in your teacher training and/or graduate courses?

Zero	0	27
One	1	
Two	2	
Three or more	3	

7. Have you received training on the instructional use of computers with respect to the teaching of mathematics?

Yes	1	28
No	2	

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SECTION II: TEACHING PRACTICES

8. What importance do you place on the instruction of the following topics?

	Not Important	Important	Very Important	
Congruence and Parallelism	1	2	3	29
Similar Figures	1	2	3	30
The Circle	1	2	3	31
Graphing Functions and Relations	1	2	3	32
Trigonometric Functions	1	2	3	33
Applications of Trigonometric Functions	1	2	3	34
Exponential and Logarithmic Functions	1	2	3	35
Graphs of Second Degree Relations	1	2	3	36
Polynomials and Equations	1	2	3	37
Absolute Value	1	2	3	38
Radicals	1	2	3	39
Problem Solving	1	2	3	40

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9. How much time per week outside of class do you think that the average student in your class will take to complete his/her mathematics homework assignments?

Less than 1 hour	1	41
1 to 2 hours	2	
Between 2 and 3 hours	3	
3 hours or more	4	

10. Do your students of mathematics have access to computers?

Yes	1	42
No (Go to Question 13)	2	

11. Approximately what percentage of time do your mathematics students spend using computers per week? *(Write the percentage in the space provided.)*

Hundreds ☐ Tens ☐ Ones ☐ % 43–45

12. Do you encourage your mathematics students to use computers to do any of the following?

	Yes	No	
To check answers to exercises	1	2	46
To practice new concepts	1	2	47
To learn new concepts and skills	1	2	48
To take tests	1	2	49
As an aid to do projects	1	2	50

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13. **In your mathematics classes how often are calculators used?**

Often (during every or almost every class)	1	
Occasionally (during about half the lessons)	2	51
Rarely	3	
Never	4	

14. **Do yuu encourage your mathematics students to use calculators to do any of the following?**

	Yes	No	
To check answers to exercises	1	2	52
To practice new concepts	1	2	53
To learn new concepts and skills	1	2	54
For use during tests	1	2	55
As an aid to do projects	1	2	56

15. **How much emphasis is placed on each of the following in preparing lessons in mathematics?**

	Not Available	None	Some	A lot	
Ministry of Education guideline	0	1	2	3	57
Board materials	0	1	2	3	58
Textbook or teacher's edition of textbook	0	1	2	3	59
Materials prepared by yourself or other teachers in your school	0	1	2	3	60
Journals or other teacher reference books	0	1	2	3	61
Commercially-produced supplementary materials	0	1	2	3	62
Materials from teacher education courses	0	1	2	3	63
Materials from your inservice workshops, conferences and seminars	0	1	2	3	64
Suggestions from students	0	1	2	3	65

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16. **What percentage of time during the school year do you use each of the following methods or aids for the teaching of mathematics?** *(Write the percentages in the spaces provided. They should total 100%.)*

	Hundreds	Tens	Ones		
A chalkboard and/or projector presentation to the class	☐	☐	☐	%	66–68
Teacher demonstration with concrete materials to the class	☐	☐	☐	%	69–71
Students working cooperatively in groups	☐	☐	☐	%	72–74
Students working individually	☐	☐	☐	%	75–77

17. **Which of the following materials do you have access to during the teaching of mathematics?**

	Yes	No	
Blackline masters (Photocopy masters)	1	2	78
Commercially produced audio-visual materials	1	2	79
Dot paper/Grid paper	1	2	80
Pattern blocks, geometric solids	1	2	81
Geometry set	1	2	82
Student-generated materials	1	2	83
Textbooks	1	2	84

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18. How much emphasis do you place on each of the following in your mathematics class?

	None	Some	A lot	
Blackline masters (photocopy masters)	1	2	3	85
Commercially produced audio-visual materials	1	2	3	86
Dot paper/Grid paper	1	2	3	87
Pattern blocks and geometric solids	1	2	3	88
Geometry set	1	2	3	89
Student-generated materials	1	2	3	90
Textbooks	1	2	3	91

19. What percentage of time is devoted to the problem solving process?
(Write the percentage in the space provided.)

Hundreds ☐ Tens ☐ Ones ☐ %

92–94

20. Which of the following best describes the problem solving component of your mathematics program?

I teach problem solving as a separate unit. 1

I integrate problem solving into the mathematics programs throughout the year. 2

95

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21. What approaches do you use in teaching problem solving?

	Yes	No	
I provide students with many puzzles and problems to solve.	1	2	96
I provide students with a systematic approach to solving problems. (e.g. understand, plan, solve, look back.)	1	2	97
I teach specific strategies for solving problems. (e.g. guess and check, make a list, draw diagram, etc.)	1	2	98
I encourage students to develop their own strategies.	1	2	99

22. How are the solutions to problems in mathematics dealt with by the students?

	Yes	No	
Students discuss their solutions with each other.	1	2	100
Students report their results to the whole class.	1	2	101
Students write up their solutions or the results of their discoveries and present them to the teacher.	1	2	102

23. Do you use diagnostic pre-tests in your mathematics class?

Never	1	
Sometimes	2	103
Often	3	

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24. On average, how often do you assess your students' learning of mathematics skills and concepts?

Less than once per month	1	
Once per month	2	
Twice per month	3	104
Three times per month	4	
Four times per month or more	5	

25. In mathematics, what percent of the students' final mark is determined through the use of the following: *(Write the percentage in the space provided. The total for the grade should add up to 100%.)*

	Hundreds	Tens	Ones		
Quizzes or short tests				%	105–107
Cumulative tests or end of unit tests				%	108–110
Formal examinations				%	111–113
Observation of student behaviour				%	114–116
Peer/Self evaluation				%	117–119
Others (Projects, assignments, etc.)				%	120–122

Thank you for your cooperation in completing this questionnaire. Please mail it back to the Ministry of Education in the pre-addressed envelope by **February 24, 1990**.

STUDENT QUESTIONNAIRE

MATHEMATICS

GRADE 12

ADVANCED LEVEL

PROVINCIAL REVIEWS

Ministry of Education
Program Implementation and Review Branch

INSTRUCTIONS

1. Make sure your Student Answer Sheet is turned to the side marked **PART A: STUDENT INFORMATION.** Use on ***HB pencil*** to fill out your answer sheet. Be sure you have an ***eraser*** available as well.

   Check to make sure you have filled in your **name**, the name of **your school board**, **your school**, and **your mathematics teacher** at the top of the Student Answer Sheet. Also make sure you have filled in all the appropriate bubbles at the top of the Student Answer Sheet.

2. Do the sample question below. To record your answer, fill in the correct bubble under the word **EXAMPLE** on your answer sheet.

   EXAMPLE What year is this?

   A) 1989
   B) 1990
   C) 1991
   D) 1992

   You should have filled in bubble **B** on your answer sheet since this is 1990.

3. There is only one part to this questionnaire:

   Student information, which includes questions about yourself, the things you do and how you feel about mathematics.

   You will be given all the time you need to complete the entire questionnaire.

4. Read each question in the questionnaire carefully.

   Next to each question number on your answer sheet, fill in the bubble that contains the letter corresponding to your response.

   Use on ***HB pencil***. Erase completely any responses you want to change.

   Record all your answers on the Student Answer Sheet.

   If you have any questions about what you are supposed to do, ask your teacher.

STUDENT INFORMATION

Record your responses to the following questions in the STUDENT INFORMATION Section of your answer sheet.

1. **Are you mole or female?**

   A) Mole.
   B) Female.

2. **In which year were you born?**

   A) 1970 or before.
   B) 1971.
   C) 1972.
   D) 1973.
   E) 1974 or after.

3. **What language do you most often speak at home?**

   A) English.
   B) French.
   C) Other.

4. **On average how much time out of school do you spend watching TV programs each day?**

   A) None at all.
   B) Up to 1 hour.
   C) Between 1 and 2 hours.
   D) Between 2 and 3 hours.
   E) More than 3 hours.

5. **About how much time do you spend on mathematics homework each week?**

   A) I don't do any mathematics homework.
   B) Less than 1 hour.
   C) One to 2 hours.
   D) More than 2 hours.

6. **How often do you get help with mathematics from someone in your family?**

   A) Never or almost never.
   B) Occasionally.
   C) Often.

7. **Which of the following describes how the mathematics program in your school is organized?**

   A) Full-year.
   B) Semestered.
   C) Other.

DO YOU LIKE DOING MATHEMATICS QUESTIONS THAT DEAL WITH:

8. **Congruence and Parallelism?**

   A) Yes.
   B) No.
   C) I'm not sure.
   D) We do not do these kinds of questions.

9. **Similar Figures?**

   A) Yes.
   B) No.
   C) I'm not sure.
   D) We do not do these kinds of questions.

DO YOU LIKE DOING MATHEMATICS QUESTIONS THAT DEAL WITH:

10. The Circle?

A) Yes.
B) No.
C) I'm not sure.
D) We do not do these kinds of questions.

11. Using Transformations?

A) Yes.
B) No.
C) I'm not sure.
D) We do not do these kinds of questions.

12. Trigonometric Functions?

A) Yes.
B) No.
C) I'm not sure.
D) We do not do these kinds of questions.

13. Applications of Trigonometry?

A) Yes.
B) No.
C) I'm not sure.
D) We do not do these kinds of questions.

14. Exponential and Logarithmic Functions?

A) Yes.
B) No.
C) I'm not sure.
D) We do not do these kinds of questions.

DO YOU LIKE DOING MATHEMATICS QUESTIONS THAT DEAL WITH:

15. Graphs of Second Degree Relations?

A) Yes.
B) No.
C) I'm not sure.
D) We do not do these kinds of questions.

16. Factor Theorem and Solving Polynomial Equations?

A) Yes.
B) No.
C) I'm not sure.
D) We do not do these kinds of questions.

17. Absolute Value?

A) Yes.
B) No.
C) I'm not sure.
D) We do not do these kinds of questions.

18. Radicals?

A) Yes.
B) No.
C) I'm not sure.
D) We do not do these kinds of questions.

19. Problem Solving?

A) Yes.
B) No.
C) I'm not sure.
D) We do not do these kinds of questions.

The following questions ask about what you and your class do when you are learning mathematics. Think about what happens in your mathematics class.

20. How often do you do mathematics at the board or on the overhead projector?

A) Almost every day.
B) Once a week or so.
C) Only once in a while.
D) Never.

21. How often is mathematics presented to the whole class as a group?

A) Almost every day.
B) Once a week or so.
C) Only once in a while.
D) Never.

22. How often do you do mathematics in small groups?

A) Almost every day.
B) Once a week or so.
C) Only once in a while.
D) Never.

23. How often do you do mathematics on your own in class?

A) Almost every day.
B) Once a week or so.
C) Only once in a while.
D) Never.

24. How often do you do projects on mathematics topics?

A) Almost every day.
B) Once a week or so.
C) Only once in a while.
D) Never.

25. How often do you do projects in other subjects that involve the use of mathematics?

A) Almost every day.
B) Once a week or so.
C) Only once in a while.
D) Never.

26. How often do you write tests or quizzes in mathematics?

A) Almost every day.
B) Once a week or so.
C) Only once in a while.
D) Never.

27. How often do you use a scientific calculator to do mathematics in class?

A) Almost every day.
B) Once a week or so.
C) Only once in a while.
D) Never.

28. How often do you use a computer to do mathematics in class?

A) Almost every day.
B) Once a week or so.
C) Only once in o while.
D) Never.

29. Do you use a scientific calculator at home?

A) No.
B) Yes.

30. Do you have a computer at home?

A) No.
B) Yes, but I don't use it.
C) Yes, I use it but not for mathematics schoolwork.
D) Yes, I use it for mathematics schoolwork only.
E) Yes, I use it for mathematics schoolwork and other things.

The following questions ask how you feel about the mathematics you are learning in school.

31. **Do you think mathematics is:**

    A) more for moles than females?
    B) more for females than moles?
    C) for everyone equally?

32. **I like mathematics.**

    A) Strongly agree.
    B) Agree.
    C) Not sure.
    D) Disagree.
    E) Strongly disagree.

33. **Mathematics helps me outside of school.**

    A) Strongly agree.
    B) Agree.
    C) Not sure.
    D) Disagree.
    E) Strongly disagree.

34. **Learning mathematics is mostly memorizing.**

    A) Strongly agree.
    B) Agree.
    C) Not sure.
    D) Disagree.
    E) Strongly disagree.

35. **I am good at mathematics.**

    A) Strongly agree.
    B) Agree.
    C) Not sure.
    D) Disagree.
    E) Strongly disagree.

36. **It is important to know mathematics in order to get a good job.**

    A) Strongly agree.
    B) Agree.
    C) Not sure.
    D) Disagree.
    E) Strongly disagree.

37. **Mathematics is difficult for me.**

    A) Strongly agree.
    B) Agree.
    C) Not sure.
    D) Disagree.
    E) Strongly disagree.

38. **When I do problems in mathematics, I usually have trouble understanding what the sentences say.**

    A) Strongly agree.
    B) Agree.
    C) Not sure.
    D) Disagree.
    E) Strongly disagree.

39. **There are usually <u>different</u> ways to solve mathematical problems.**

    A) Strongly agree.
    B) Agree.
    C) Not sure.
    D) Disagree.
    E) Strongly disagree.

WHEN YOU DON'T UNDERSTAND A PROBLEM IN MATHEMATICS DO YOU:

40. Try different ways to solve it on your own?

A) Often.
B) Sometimes.
C) Never.

41. Ask another student for help?

A) Often.
B) Sometimes.
C) Never.

42. Ask your teacher for help?

A) Often.
B) Sometimes.
C) Never.

43. Wait and ask someone at home?

A) Often.
B) Sometimes.
C) Never.

44. Just give up?

A) Often.
B) Sometimes.
C) Never.

Leave Questions 45 to 48 blank on your answer sheet.

THIS IS THE END OF THE QUESTIONNAIRE.

Make sure you have answered all the questions in **Part A** on your answer sheet and that you have erased carefully all the answers you have changed.

Please raise your hand to let the teacher know you have finished.

Thank you for your participation.

STUDENT ASSESSMENT BOOKLET

MATHEMATICS

Grade 12 Mathematics, Advanced Level

1

PROVINCIAL REVIEWS

Program Implementation & Review Branch
Ministry of Education

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INSTRUCTIONS

1. Make sure your *Mathematics Student Answer Sheet* is turned to side 1 (title at top of page). Use an ***HB pencil*** to fill out your answer sheet.

   Be sure you have the following materials available:

   - eraser
   - ruler
   - scientific calculator

2. Fill in your name, the name of **your school board**, **your school**, and **your mathematics teacher** at the top of the *Mathematics Student Answer Sheet*. Also make sure you have filled in all the appropriate bubbles at the top of the sheet.

3. Do the sample question below. To record your answer, fill in the correct bubble under the word **EXAMPLE** on your answer sheet.

   EXAMPLE What year is this?

   A) 1989
   B) 1990
   C) 1991
   D) 1992

   You should have filled in bubble **B** on your answer sheet since this is 1990.

4. There are 25 questions in this **Student Assessment Booklet**. Some are multiple-choice and will be answered on the *Mathematics Student Answer Sheet*. Others are open-ended and will be answered directly in this booklet.

   You will be given all the time you need to complete the entire booklet.

5. Read each question in the booklet carefully. Next to each question number on your answer sheet, fill in the bubble that contains the letter corresponding to your response. Erase completely any responses you want to change.

6. On the front cover you will find a booklet number. On your answer sheet, find the box that corresponds to your booklet number. Be sure to record your answers in this box.

   If you have any questions about what you are supposed to do, ask your teacher.

1. When $x^3 + 2x^2 + 5x + 11$ is divided by $(x + 2)$, the remainder is:

   A) 37

   B) 1

   C) 0

   D) −15

2. The roots of $2x^3 + 7x^2 = 2x + 7$ are:

   A) $1, -\frac{1}{2}, -7$

   B) $1, -1, -\frac{2}{7}$

   C) $1, -1, -\frac{7}{2}$

   D) $1, -1, \frac{7}{2}$

3. The expression $|x|$ may be defined as:

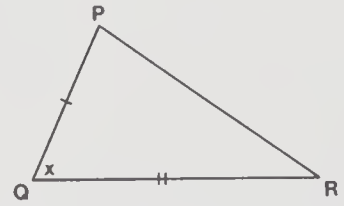
   A) x, if $x = 0$
      $-x$, if $x > 0$

   B) $\pm x$

   C) x, if $x < 0$
      $-x$, if $x \geq 0$

   D) x, if $x \geq 0$
      $-x$, if $x < 0$

4. Examine the triangle below.

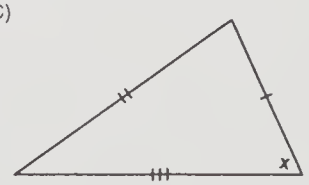


A triangle which is congruent to $\triangle PQR$ is:

A)

B)

C)



D)

5. The set of all points in a plane which are 10 units from a point **P** in the plane is:

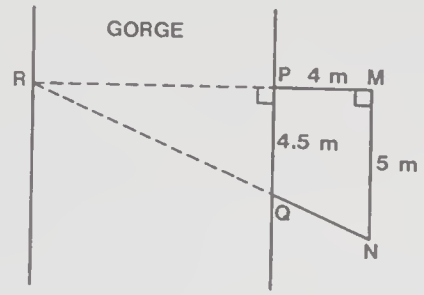
   A) a circle with centre **P** and radius 5 units.

   B) a circle with centre **P** and radius 10 units.

   C) a line which is 10 units from **P**.

   D) two parallel lines, each of which is 10 units from **P**.

6. During a course in orienteering, you have to determine the distance across a gorge. **R** is a rock on one edge of the gorge. You position markers **P**, **Q**, **M**, and **N** as shown in the diagram.



If **P** and **Q** are on the edge of the gorge, then the distance PR across the gorge is:

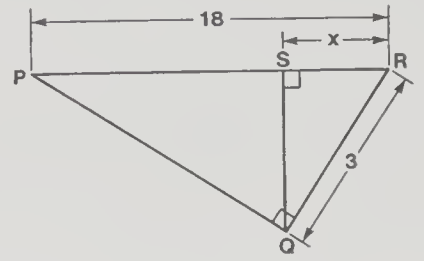
A) 3.2 m

B) 3.6 m

C) 36.0 m

D) 40.0 m

7. In the diagram below, PR = 18, QR = 3, and SR = x.



x is equal to:

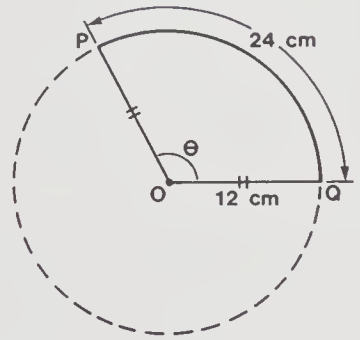
A) 2

B) $\frac{3}{2}$

C) 1

D) $\frac{1}{2}$

8. Examine the diagram below.



The measure of $\angle\theta$ in radians is:

A) $\frac{1}{2}$

B) 2

C) $\frac{2}{\pi}$

D) 2π

9. The negation of the statement $\angle P > \angle Q$ is:

A) $\angle P \leq \angle Q$

B) $\angle P < \angle Q$

C) $\angle P = \angle Q$

D) $\angle P \neq \angle Q$

10. If $f(x) = 3 - x^2$ and $g(x) = \sqrt{6-x}$, then the value of $g(f(1))$ is:

A) 2

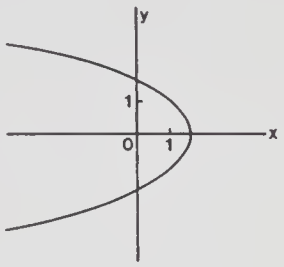
B) −2

C) $\sqrt{5}$

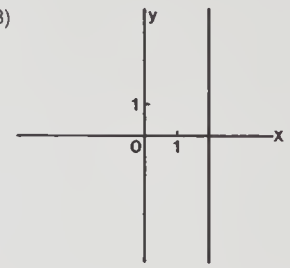
D) 5

11. Which of the following is the graph of a function?

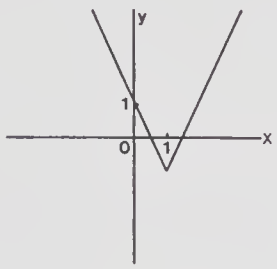
A)



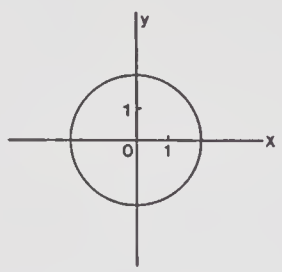
B)



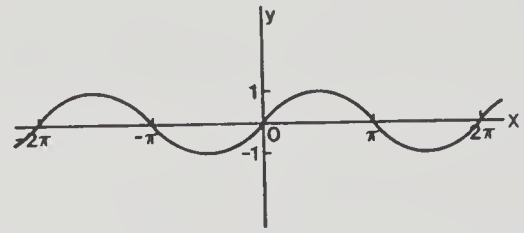
C)



D)



12. Examine the following diagram.



An equation of the curve is:

A) $y = \sin x$

B) $y = \cos x$

C) $y = -\cos x$

D) $y = \frac{1}{2}\sin x$

13. The range of $y = \sec \theta$ is:

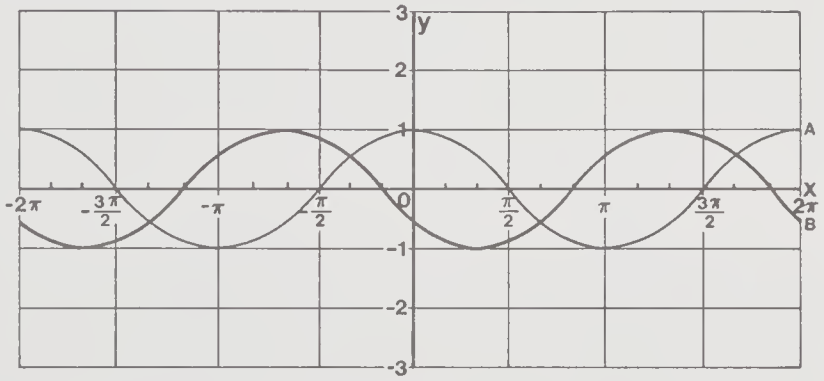
A) $\{y \mid y \geq 1\}$

B) $\{y \mid y \leq -1\}$

C) $\{y \mid -1 \leq y \leq 1\}$

D) $\{y \mid y \geq 1 \text{ or } y \leq -1\}$

14. Examine the diagram below.



The transformation that maps graph **A** to graph **B** is:

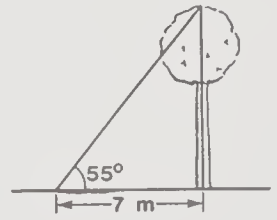
A) a shift of $\frac{2\pi}{3}$ to the left.

B) a shift of $\frac{\pi}{3}$ to the right.

C) a shift of $\frac{\pi}{3}$ to the left.

D) a shift of $\frac{2\pi}{3}$ to the right.

15. A tree casts a shadow 7 m long when the angle of elevation of the sun is 55°.



The height of the tree to the nearest tenth of a metre is:

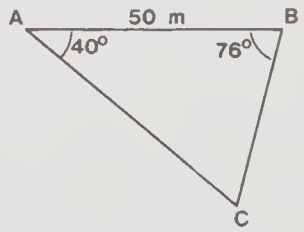
A) 4.0 m

B) 4.9 m

C) 5.7 m

D) 10.0 m

16. Examine the diagram below.



The length of AC to the nearest metre is:

A) 36 m

B) 46 m

C) 54 m

D) 76 m

17. An expression equivalent to $\frac{\cos x - 1}{\cos x \sin x} + \frac{\sin x}{\cos x}$ is:

A) $\frac{(\cos x + 2)(\cos x - 1)}{\cos x \sin x}$

B) $\frac{1 + \cos x}{\sin x}$

C) $\frac{\cos x - \cos^2 x}{\sin x}$

D) $\frac{1 - \cos x}{\sin x}$

18. The expression $3a^{\frac{1}{2}} \times 3a^{-\frac{1}{2}}$ equals:

A) 1

B) 9

C) $9a^{-\frac{1}{4}}$

D) 9a

19. The expression $4^{\log_4 65}$ equals:

A) 65

B) 51.2

C) 12.34

D) 7.25

20. If $\log_b 2 = \frac{1}{3}$, then $\log_b 32$ is equal to:

A) 5

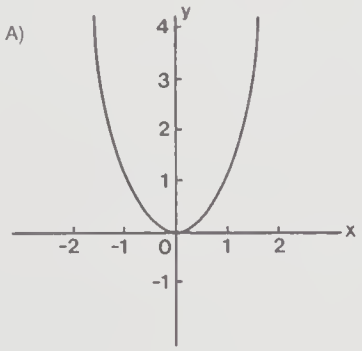
B) $-\frac{3}{5}$

C) $\frac{5}{3}$

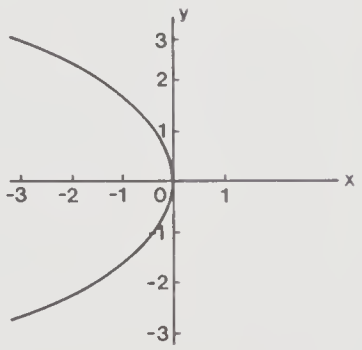
D) $\frac{3}{\log_2 32}$

21. Which of the following is the graph of $y = -\frac{1}{4}x^2$?

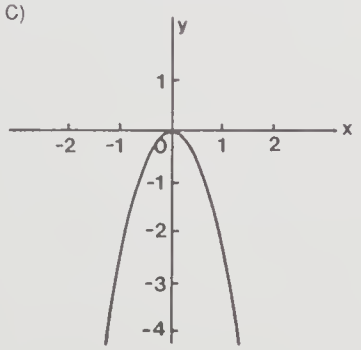
A)



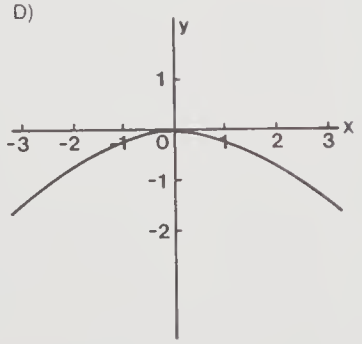
B)



C)



D)



22. The transformation which maps the graph of $x^2 - y^2 = 1$ to the graph of $\frac{x^2}{9} - \frac{y^2}{25} = 1$ is:

A) a stretch in the x-direction of factor $\frac{1}{3}$ and in the y-direction of factor $\frac{1}{5}$.

B) a stretch in the x-direction of factor 3 and in the y-direction of factor 5.

C) a stretch in the x-direction of factor 9 and in the y-direction of factor 25.

D) a stretch in the x-direction of factor $\frac{1}{9}$ and in the y-direction of factor $\frac{1}{25}$.

PLACE YOUR ANSWERS IN THE SPACES PROVIDED.

23. Factor completely $6x^2 + 25x - 9$.

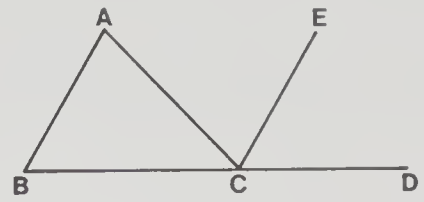
Answer: _____

24. Evaluate $(-15)^{\frac{1}{5}}$ correct to 2 decimal places.

Answer: _____

SHOW YOUR WORK.

25. Given $\triangle$ ABC with BC produced to D. EC bisects $\angle$ ACD and EC $\parallel$ AB.



Prove: $\triangle$ ABC is isosceles.

STUDENT ASSESSMENT BOOKLET

Grade 12 Mathematics, Advanced Level

2

MATHEMATICS

Program Implementation & Review Branch
Ministry of Education

PROVINCIAL REVIEWS

INSTRUCTIONS

1. Make sure your *Mathematics Student Answer Sheet* is turned to side 1 (title at top of page). Use an ***HB pencil*** to fill out your answer sheet.

   Be sure you have the following materials available:

   - eraser
   - ruler
   - scientific calculator

2. Fill in your name, the name of your school board, your school, and your mathematics teacher at the top of the *Mathematics Student Answer Sheet*. Also make sure you have filled in all the appropriate bubbles at the top of the sheet.

3. Do the sample question below. To record your answer, fill in the correct bubble under the word **EXAMPLE** on your answer sheet.

   EXAMPLE What year is this?

   A) 1989
   B) 1990
   C) 1991
   D) 1992

   You should have filled in bubble **B** on your answer sheet since this is 1990.

4. There are 25 questions in this **Student Assessment Booklet**. Some are multiple-choice and will be answered on the *Mathematics Student Answer Sheet*. Others are open-ended and will be answered directly in this booklet.

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41. One of the factors of $x^3 - 7x^2 + 17x - 20$ is:

A) $x - 3$

B) $x + 3$

C) $x + 4$

D) $x - 4$

42. The roots of $kx^2 - 3x + 4k = 0$ are:

A) $\frac{3 + \sqrt{9 - 16k}}{2}$ and $\frac{3 - \sqrt{9 - 16k}}{2}$

B) $\frac{3 + \sqrt{9 - 16k^2}}{2k}$ and $\frac{3 - \sqrt{9 - 16k^2}}{2k}$

C) $\frac{3 + \sqrt{9 + 16k^2}}{2k}$ and $\frac{3 - \sqrt{9 + 16k^2}}{2k}$

D) $\frac{3 + \sqrt{9 - 16k^2}}{2}$ and $\frac{3 - \sqrt{9 - 16k^2}}{2}$

43. When $2x^3 - 5x^2 + 6x - 1$ is divided by $x + 2$ the quotient is:

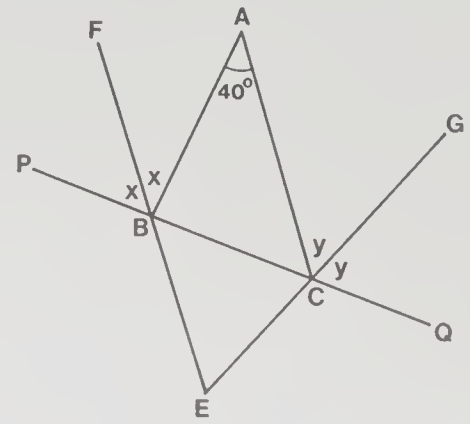
A) $2x^2 - 9x + 15$

B) $2x^2 - x + 4$

C) $2x^2 - 9x + 24$

D) $2x^2 - 9x - 12$

44. Given the following diagram.



The degree measure of $\angle BEC$ is:

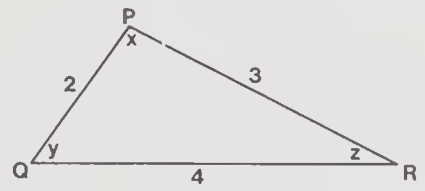
A) 40°

B) 70°

C) 80°

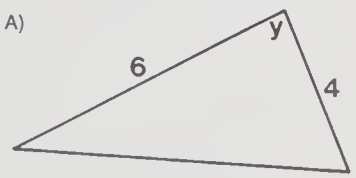
D) 110°

45. Examine the triangle below.

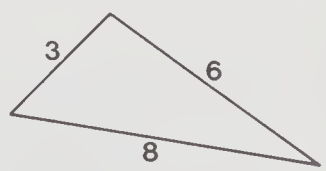


The following diagrams are not drawn to scale. Which triangle is similar to △ PQR:

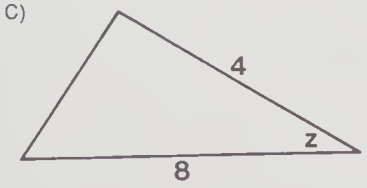
A)



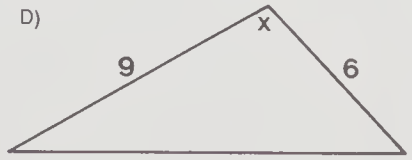
B)



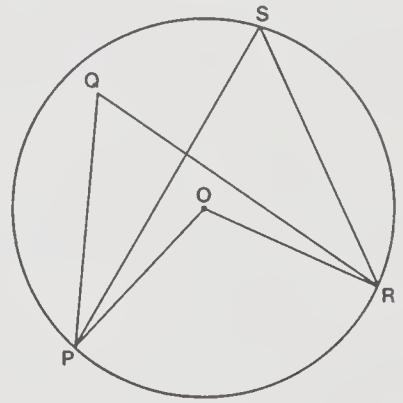
C)



D)



46. The circle below has centre O.



The inscribed angle(s) on arc PR shown in the diagram is (are):

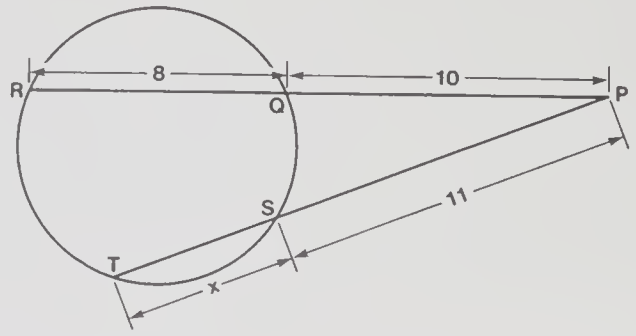
A) ∠PSR only

B) ∠PQR only

C) ∠PSR and ∠PQR

D) ∠PSR, ∠PQR, and ∠POR

47. PQR and PST are secants to a circle.



The value of x correct to one decimal is:

A) 5.4

B) 7.0

C) 7.3

D) 8.8

48. The graph of $y = f(x)$ is vertically stretched by factor 2, then horizontally shifted left by 3 units. Which of the following is the equation of the resulting graph?

A) $y = 2f(x - 3)$

B) $y = f(2x) - 3$

C) $y = f(\frac{1}{2}x + 3)$

D) $y = 2f(x + 3)$

49. The intercept of $y = \cos\left(x - \frac{\pi}{3}\right)$ with the y-axis is:

A) 1

B) 0.5

C) −0.5

D) −1

50. If $\sin\theta = \frac{1}{2}$, and $90° < \theta < 180°$, then the value of θ is:

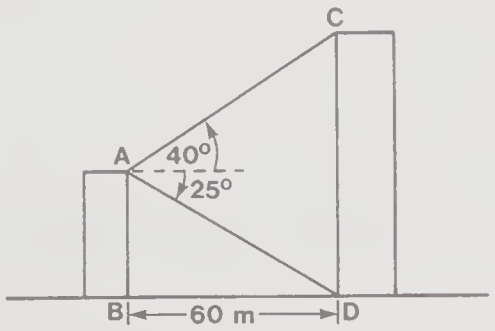
A) 150°

B) 120°

C) 30°

D) 0.0087°

51. Two buildings are 60 m apart. From the top of the smaller building, the angle of depression of the base of the taller building is 25° and the angle of elevation of the top is 40°



The height of the taller building, to the nearest metre, is:

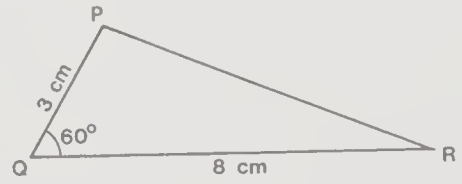
A) 28 m

B) 50 m

C) 78 m

D) 129 m

52. Examine the following triangle.



The length of PR, to the nearest centimetre, is:

A) 4 cm

B) 7 cm

C) 10 cm

D) 49 cm

53. An expression equivalent to $(1 + \sec x)(1 - \cos x)$ is:

A) $\tan x - \sin x$

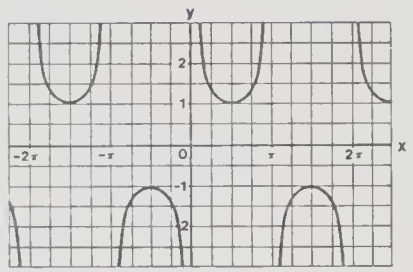
B) $\frac{1 - \cos x}{\cos x}$

C) $\frac{\sin^2 x}{\cos x}$

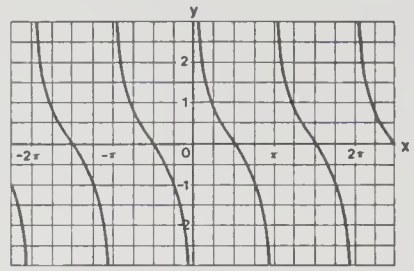
D) $\cos x$

54. The graph of $y = \csc x$, $-2\pi \leq x \leq 2\pi$, is:

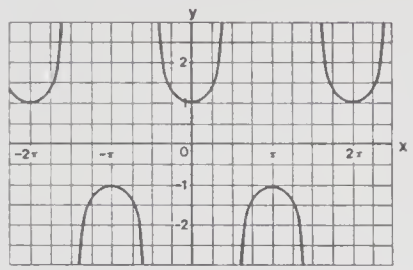
A)



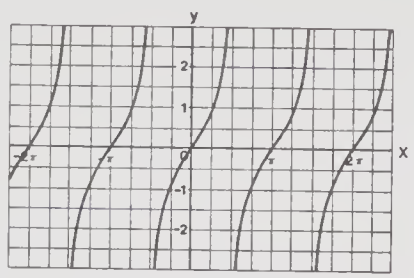
B)



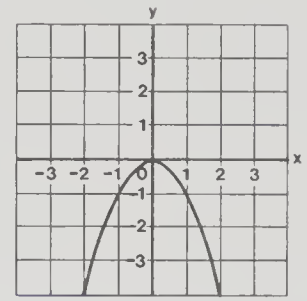
C)



D)

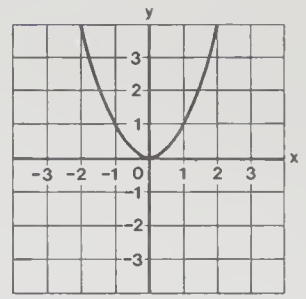


55. Examine the graph below.

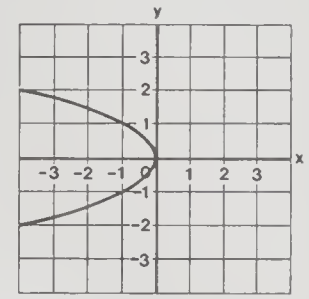


Which of the following is the graph of the **inverse** of the given relation?

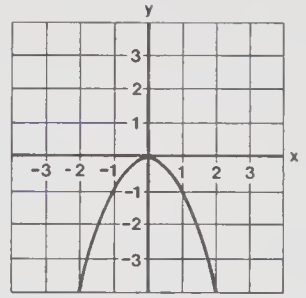
A)



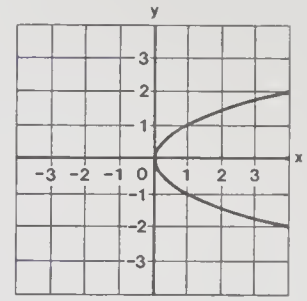
B)



C)



D)



56. The expression $\frac{|-3| - (-3)}{2}$ equals:

(A) –3

(B) 0

(C) 3

(D) $\frac{9}{2}$

57. If $10^a = 4$, then $10^{(1+2a)}$ is equal to:

A) 26

B) 40

C) 160

D) 900

58. The equivalent form of $\log_m p = r$ is:

A) $p^r = m$

B) $r^m = p$

C) $p^m = r$

D) $m^r = p$

59. Suppose the number of bacteria in a certain culture **T** hours from now will be $100(2.7)^T$. The time it will take for the bacteria count to reach 600 is approximately:

A) 2 h

B) 3 h

C) 6 h

D) 12 h

60. The centre and radius of the circle defined by $(x + 3)^2 + (y - 1)^2 = 4$ are:

A) centre (3,–1); radius 2

B) centre (3,–1); radius 4

C) centre (–3,1); radius 4

D) centre (–3,1); radius 2

61. The coordinates of the vertices of the ellipse defined by $x^2 + 9y^2 = 81$ are:

A) (3,0) and (–3,0)

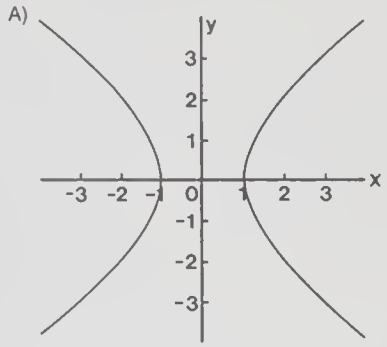
B) (0,3) and (0,–3)

C) (9,0) and (–9,0)

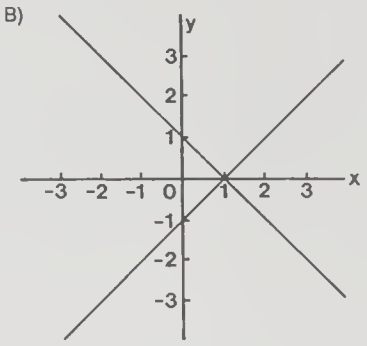
D) (0,9) and (0,–9)

62. Which of the following is the graph of $x^2 - y^2 = 1$?

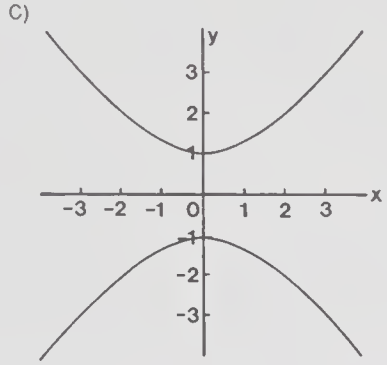
A)



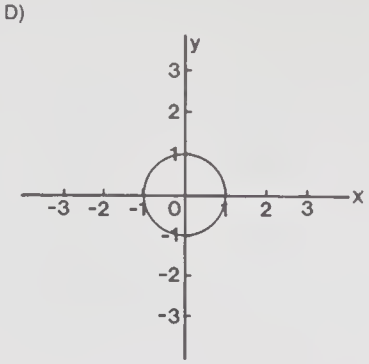
B)



C)



D)



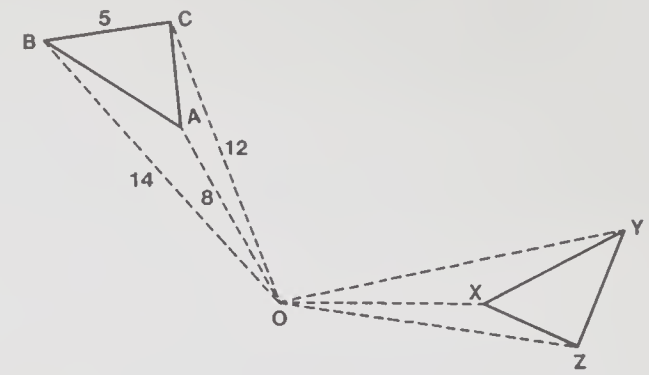
PLACE YOUR ANSWERS IN THE SPACES PROVIDED.

63. Evaluate $17^{0.75}$ correct to 2 decimal places.

Answer: _____

64. $\triangle$ XYZ is the image of $\triangle$ ABC under a clockwise rotation of 120° about O.

BC = 5 cm, OC = 12 cm, OA = 8 cm, OB = 14 cm.

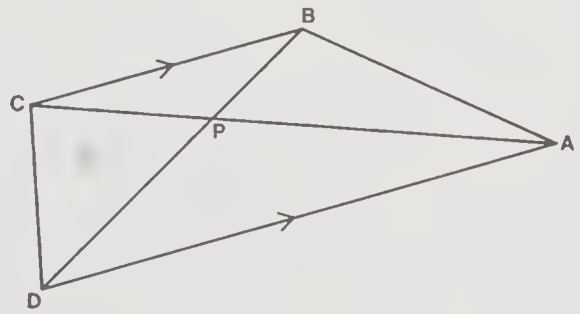


The length of OZ is_____.

The measure of $\angle$AOX is_____.

SHOW YOUR WORK.

65. Given the trapezoid below ABCD with AC and BD intersecting at **P**.



Prove: △ APD is similar to △ CPB.

STUDENT ASSESSMENT BOOKLET

MATHEMATICS

Grade 12 Mathematics, Advanced Level

3

PROVINCIAL REVIEWS

Program Implementation & Review Branch
Ministry of Education

37

INSTRUCTIONS

1. Make sure your *Mathematics Student Answer Sheet* is turned to side 1 (title at top of page). Use an ***HB pencil*** to fill out your answer sheet.

   Be sure you have the following materials available:

   - eraser
   - ruler
   - scientific calculator

2. Fill in your **name**, the name of **your school board**, **your school**, and **your mathematics teacher** at the top of the *Mathematics Student Answer Sheet.* Also make sure you have filled in all the appropriate bubbles at the top of the sheet.

3. Do the sample question below. To record your answer, fill in the correct bubble under the word **EXAMPLE** on your answer sheet.

   EXAMPLE What year is this?

   A) 1989
   B) 1990
   C) 1991
   D) 1992

   You should have filled in bubble B on your answer sheet since this is 1990.

4. There are 25 questions in this **Student Assessment Booklet**. Some are multiple-choice and will be answered on the *Mathematics Student Answer Sheet.* Others are open-ended and will be answered directly in this booklet.

   You will be given all the time you need to complete the entire booklet.

5. Read each question in the booklet carefully. Next to each question number on your answer sheet, fill in the bubble that contains the letter corresponding to your response. Erase completely any responses you want to change.

6. On the front cover you will find a booklet number. On your answer sheet, find the box that corresponds to your booklet number. Be sure to record your answers in this box.

   If you have any questions about what you are supposed to do, ask your teacher.

37 R

81. In factored form, $x^3 - 64$ is equivalent to:

A) $(x - 4)(x^2 + 4x + 16)$

B) $(x + 4)(x^2 - 4x + 16)$

C) $(x - 4)(x + 4)^2$

D) $(x - 4)^3$

82. The expression $\sqrt{(-9)^2}$ is equal to:

A) -9

B) -3

C) $|3|$

D) $|-9|$

83. If $\log_x 243 = 5$, then the value of x is:

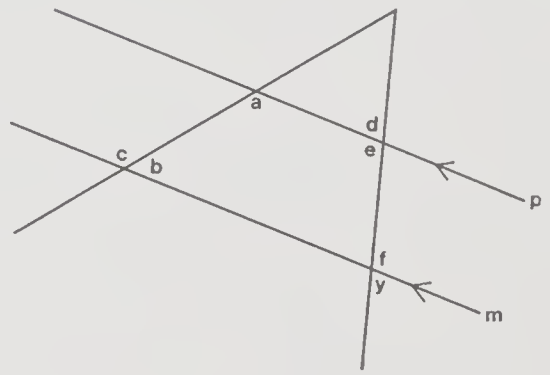
A) 1 215.0

B) 48.6

C) 3.0

D) 0.8

84. Examine the following diagram.



If line **p** is parallel to line **m**, then:

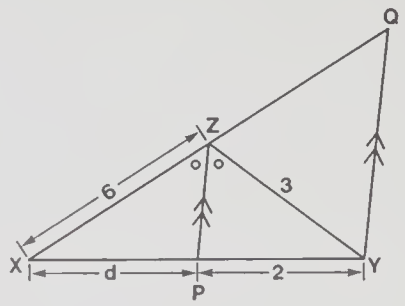
A) $b = a$

B) $a + b = 180°$

C) $a + e = 180°$

D) $b = f$

85. In the diagram below, PZ is the bisector of $\angle XZY$ and PZ || YQ.



d is equal to:

A) 1

B) $\frac{4}{3}$

C) 4

D) 9

86. The measure of an angle in degrees is $\frac{180}{\pi}$. The measure of the angle in radians is:

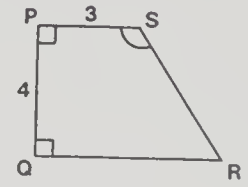
A) $\frac{1}{\pi}$

B) 1

C) $\frac{180}{\pi^2}$

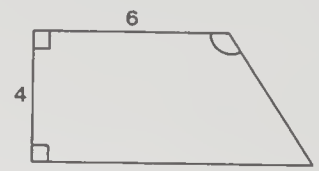
D) 57

87. Examine quadrilateral PQRS.

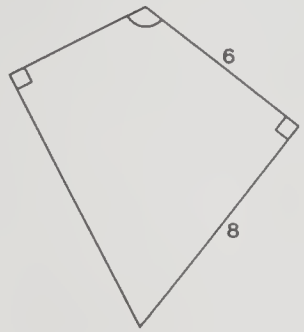


Which quadrilateral is similar to PQRS?

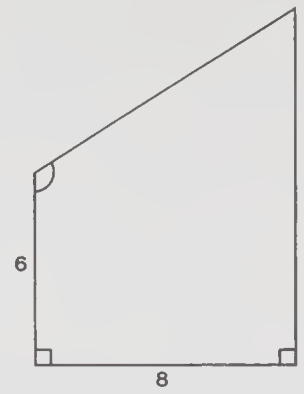
A)



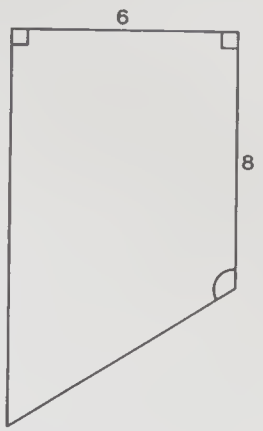
B)



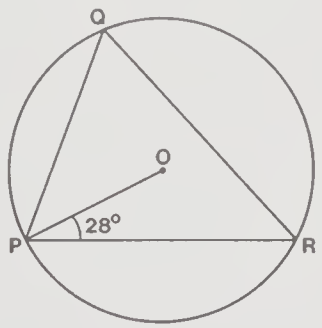
C)



D)



88. O is the centre of the circle below.



If $\angle OPR = 28°$, then the measure of $\angle PQR$ is:

A) 56°

B) 62°

C) 118°

D) 124°

89. The radius of a circle with centre O is 12 cm. The area of the sector with sector angle 1.3 radians to the nearest square centimetre is:

A) 187 cm^2

B) 94 cm^2

C) 55 cm^2

D) 16 cm^2

90. The functions **f** and **g** are defined by $f(x) = x - 1$ and $g(x) = (x + 3)^2$. Therefore $g(f(x))$ is equal to:

A) $(x - 1)(x + 3)^2$

B) $(x + 3)^2 - 1$

C) $(2x - 2)^2$

D) $(x + 2)^2$

91. Which of the following functions has a negative value?

A) $\sin\frac{5\pi}{12}$

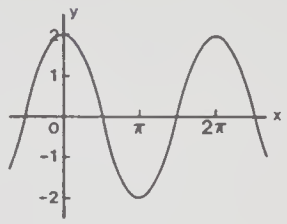
B) $\tan\frac{5\pi}{4}$

C) $\tan\frac{5\pi}{6}$

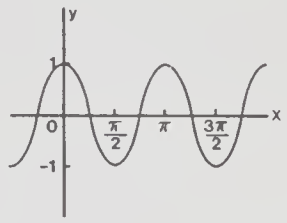
D) $\cos\frac{5\pi}{3}$

92. The graph of $y = 2\cos(2x)$ is:

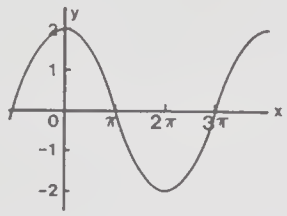
A)



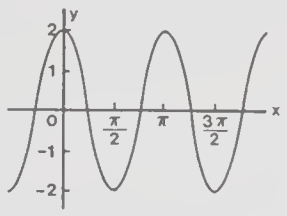
B)



C)



D)



93. The period of $y = \frac{1}{3}\cos 2x$ is:

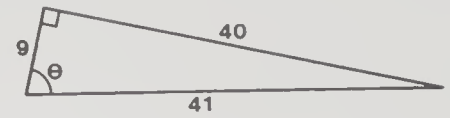
A) $\frac{\pi}{3}$

B) $\frac{\pi}{2}$

C) π

D) 4

94. Examine the triangle below.



$\tan\theta$ is equal to:

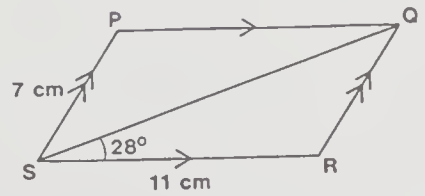
A) $\frac{9}{41}$

B) $\frac{9}{40}$

C) $\frac{40}{41}$

D) $\frac{40}{9}$

95. In parallelogram PQRS, SP = 7 cm, SR = 11 cm, ∠QRS = 28°.



The measure of ∠SRQ to the nearest degree is:

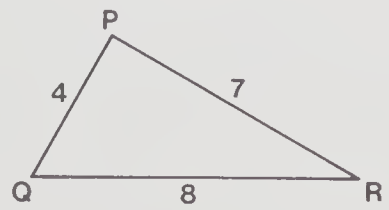
A) 17°

B) 48°

C) 104°

D) 135°

96. Examine the following triangle:



The measure of ∠Q is:

A) 14°

B) 30°

C) 61°

D) 89°

NOTE: Question 95 should read ∠*QRS*=28°.
The error appeared in the orginal booklet.

97. If $0° \leq \theta \leq 360°$, then the exact values of θ which satisfy the equation $(\sin \theta)(2 \cos \theta - 1) = 0$ are:

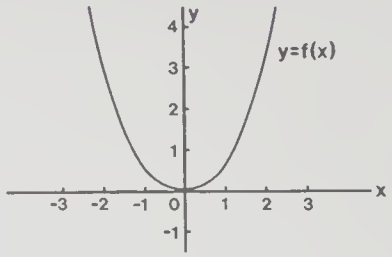
A) 0°, 60°, 180°, 300°, 360°

B) 0°, 60°, 120°, 180°, 360°

C) 60°, 300°

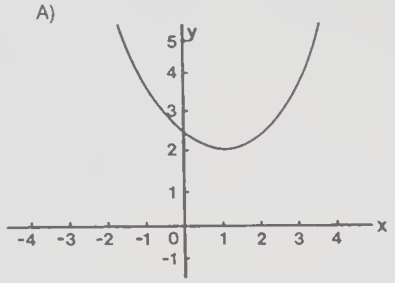
D) 0°, 180°, 240°, 300°, 360°

98. Examine the diagram below.

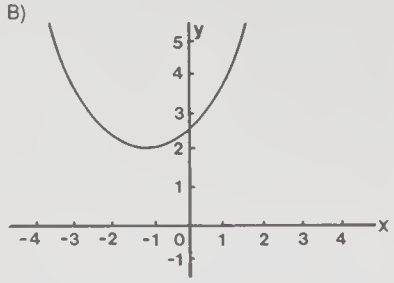


Which of the following is the graph of $y = \frac{1}{2} f(x - 1) + 2$?

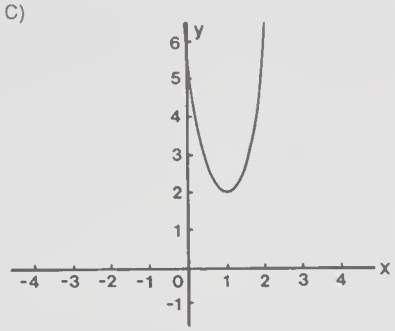
A)



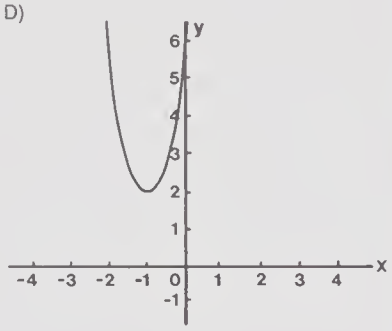
B)



C)

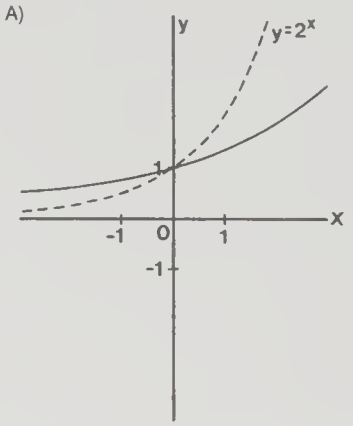


D)

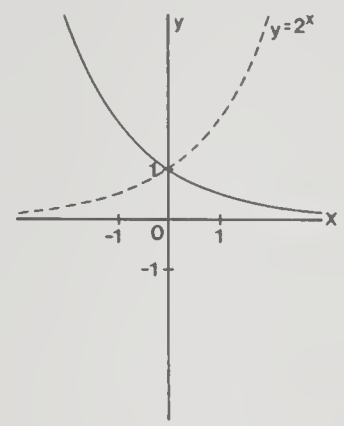


99. In each of the following, the graph of $y = 2^x$ is the dotted curve. Which diagram also shows the graph of $y = \left(\frac{1}{2}\right)^x$?

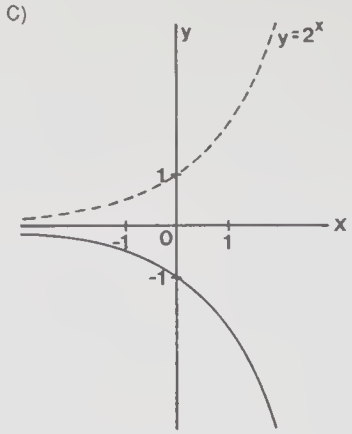
A)



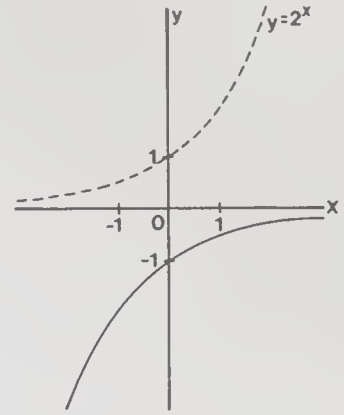
B)



C)

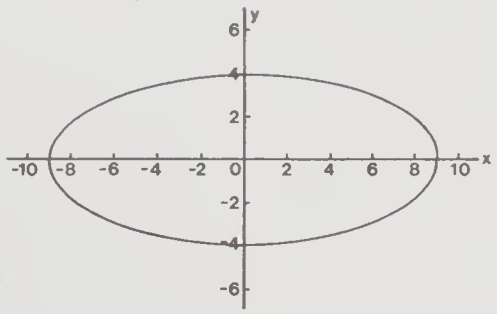


D)

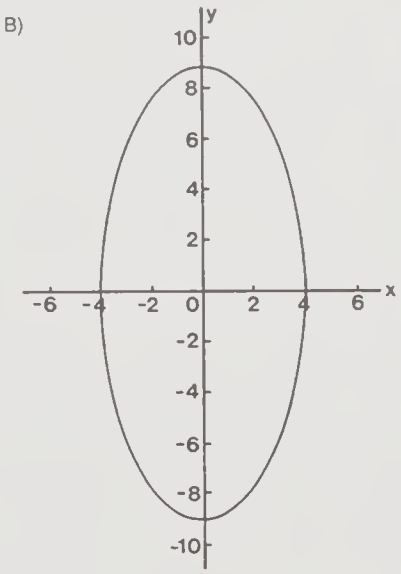


100. Which of the following is the graph of $\left(\frac{x}{2}\right)^2 + \left(\frac{y}{3}\right)^2 = 1$?

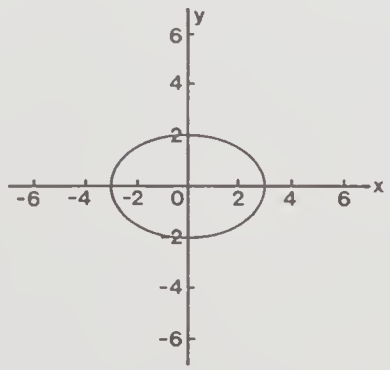
A)



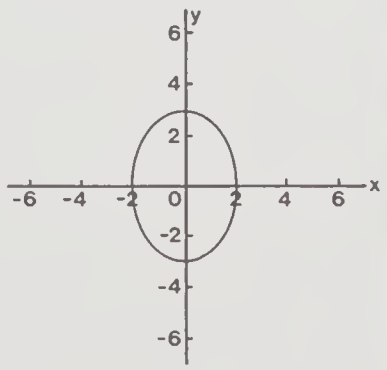
B)



C)



D)



101. The transformation which maps the graph of $x^2 + y^2 = 9$ to the graph of $(x - 2)^2 + (y - 7)^2 = 9$ is:

A) a translation of 2 to the right and 7 up.

B) a translation of 2 to the left and 7 down.

C) a stretch in the x-direction of factor 2 and in the y-direction of factor 7.

D) a stretch in the x-direction of factor $\frac{1}{2}$ and in the y-direction of factor $\frac{1}{7}$.

102. At the end of 8 years, the value of a \$700 investment certificate is \$1 034.22. If the interest is compounded annually, then the annual rate of interest for this certificate is:

A) 5 %

B) 6 %

C) 10 %

D) 105 %

PLACE YOUR ANSWERS IN THE SPACES PROVIDED.

103. Factor completely $xy + 3x - 2y - 6$.

Answer: _____

104. What is the length of a side of a rhombus with diagonals of length 24 cm and 10 cm?

Answer: _____ cm

SHOW YOUR WORK.

105. Solve $|x - 2| = 5$.

STUDENT ASSESSMENT BOOKLET

Grade 12 Mathematics, Advanced Level

4

Program Implementation & Review Branch
Ministry of Education

INSTRUCTIONS

1. Make sure your *Mathematics Student Answer Sheet* is turned to side 1 (title at top of page). Use an ***HB pencil*** to fill out your answer sheet.

   Be sure you have the following materials available:

   - eraser
   - ruler
   - scientific calculator

2. Fill in your **name**, the name of **your school board**, **your school**, and **your mathematics teacher** at the top of the *Mathematics Student Answer Sheet*. Also make sure you have filled in all the appropriate bubbles at the top of the sheet.

3. Do the sample question below. To record your answer, fill in the correct bubble under the word **EXAMPLE** on your answer sheet.

   EXAMPLE What year is this?

   A) 1989
   B) 1990
   C) 1991
   D) 1992

   You should have filled in bubble **B** on your answer sheet since this is 1990.

4. There are 25 questions in this **Student Assessment Booklet**. Some are multiple-choice and will be answered on the *Mathematics Student Answer Sheet*. Others are open-ended and will be answered directly in this booklet.

   You will be given all the time you need to complete the entire booklet.

5. Read each question in the booklet carefully. Next to each question number on your answer sheet, fill in the bubble that contains the letter corresponding to your response. Erase completely any responses you want to change.

6. On the front cover you will find a booklet number. On your answer sheet, find the box that corresponds to your booklet number. Be sure to record your answers in this box.

   If you have any questions about what you are supposed to do, ask your teacher.

121. The roots of $2x^2 - 11x + 5 = 0$ are:

A) $\frac{1}{2}$ and 5

B) $-\frac{1}{2}$ and -5

C) $\frac{5}{2}$ and 1

D) $-\frac{5}{2}$ and -1

122. The number of years it would take an investment of \$1 000.00 to double in value at 9 %/a compounded annually is approximately:

A) 0.26

B) 0.34

C) 2.0

D) 8.0

123. The expression $\sqrt[3]{(-2)^3}$ is equal to:

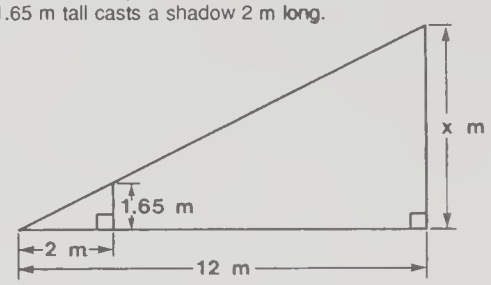
A) -2

B) -8

C) 2

D) $|-2|$

124. At a certain time of day a tree casts a shadow that is 12 m long. At the same time of day a man 1.65 m tall casts a shadow 2 m long.



The height of the tree is approximately:

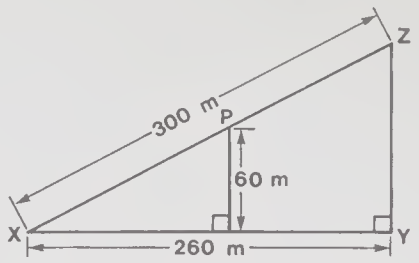
A) 0.145 m

B) 9.9 m

C) 14.5 m

D) 990.0 m

125. A ski hill 300 m long is modelled by the diagram below. At the top of the hill, the run is 260 m.



A skier stops at a point, P, on the hill at which the rise is 60 m. To reach the bottom of the hill, the skier still must ski a distance of approximately:

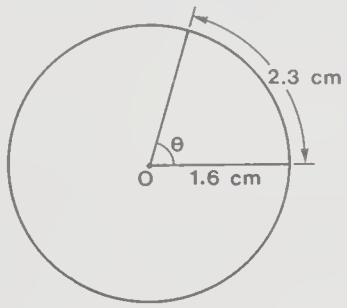
A) 130 m

B) 120 m

C) 69 m

D) 52 m

126. Examine the circle below with centre O.



The measure of $\angle\theta$ to the nearest tenth of a degree is:

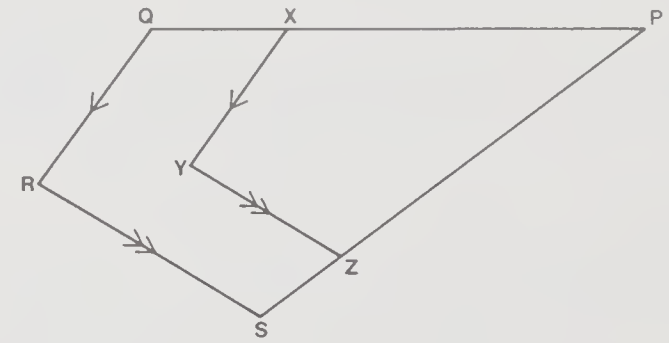
A) 1.4°

B) 41.2°

C) 82.4°

D) 103.0°

127. In the following diagram, quadrilateral PQRS is similar to quadrilateral PXYZ. The area of PQRS is 75 cm^2, and the area of PXYZ is 48 cm^2.



If PQ is 20 cm long, then the length of PX is:

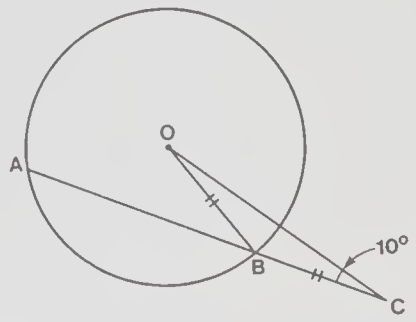
A) 12.8 cm

B) 31.25 cm

C) 25 cm

D) 16 cm

128. In the diagram below, AB is any chord of the circle with centre **O**, OB = BC, and ∠OCB = 10°.



The measure of ∠AOB in degrees is:

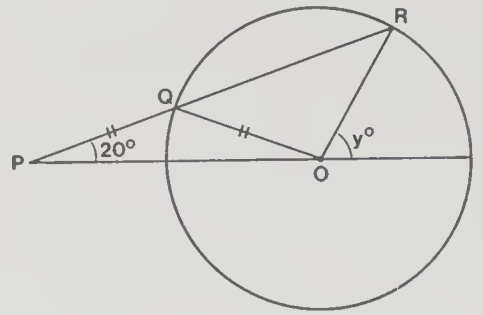
A) 130°

B) 140°

C) 150°

D) 160°

129. PQR is a secant to the circle below with centre O and PQ = OQ.



The value of y is:

A) 40

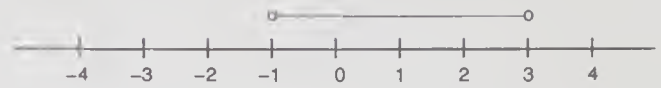
B) 60

C) 80

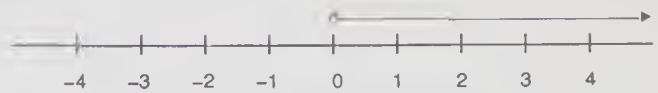
D) 140

130. The graph of $|x - 1| < 2$ is:

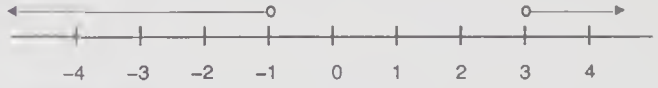
A)



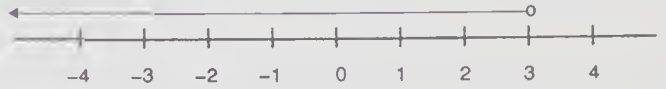
B)



C)



D)



131. The measure of an angle in radians is $\frac{11}{3}\pi$. The measure of the angle in degrees is.

A) 1 320

B) 733

C) 660

D) 11.5

132. The phase shift of $f(x) = 2\cos(3x - \pi)$ is:

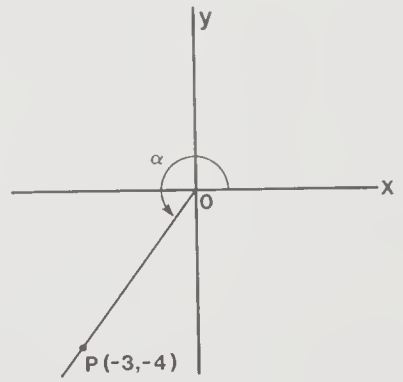
A) $-\pi$

B) $-\frac{\pi}{3}$

C) π

D) $\frac{\pi}{3}$

133. Examine the following diagram.



The value of $\cos\alpha$ is:

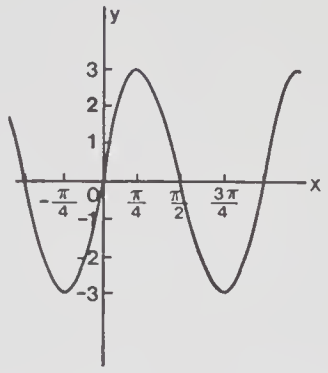
A) $\frac{4}{3}$

B) $-\frac{3}{5}$

C) $-\frac{4}{5}$

D) $-\frac{5}{3}$

134. Examine the following diagram.



An equation of the curve is:

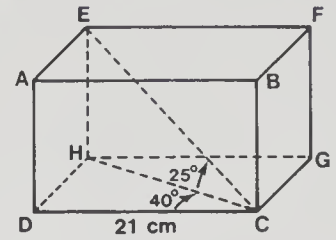
A) $y = 3\sin 2x$

B) $y = 3\cos 2x$

C) $y = 3\sin x$

D) $y = 3\cos\left(\frac{x}{2}\right)$

135. The diagonal of the base of a rectangular box, HC, makes an angle of 40° with the edge DC. The diagonal of the box, EC, makes an angle of 25° with the diagonal HC.



If the length of DC is 21 cm, then the length of EC to the nearest centimetre is:

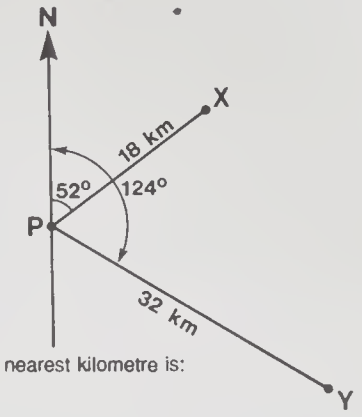
A) 15 cm

B) 16 cm

C) 25 cm

D) 30 cm

136. Two ships sail from a port **P**, at the same time. After three hours, their positions are **X** and **Y** as shown below.



The distance between **X** and **Y** to the nearest kilometre is:

A) 8 km

B) 31 km

C) 41 km

D) 992 km

137. The number of roots of $2\cos x = 1$ in the domain $0 \leq x \leq 2\pi$ is:

A) 0

B) 1

C) 2

D) 4

138. The expression $\log_2 64$ equals:

A) 1.8

B) 4.2

C) 6.0

D) 8.0

139. If $\log N = n$, then $\log N^2$ is equal to:

A) $n + 2$

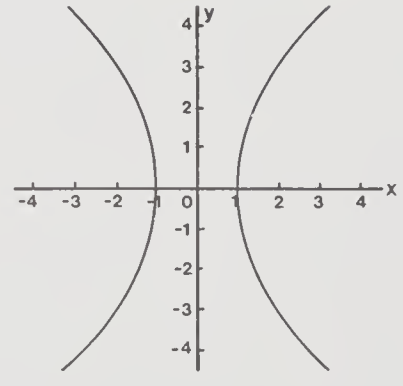
B) n^2

C) $\frac{n}{2}$

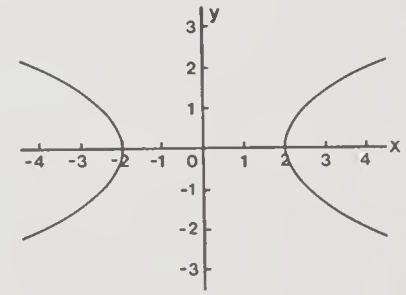
D) $2n$

140. Which of the following is the graph of $x^2 - \frac{y^2}{4} = -1$?

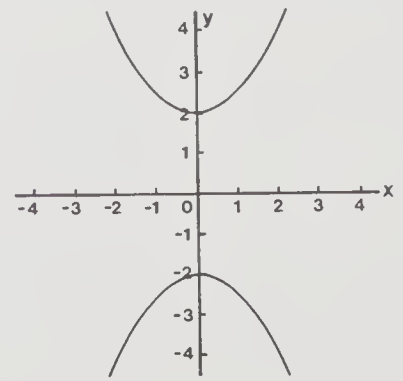
A)



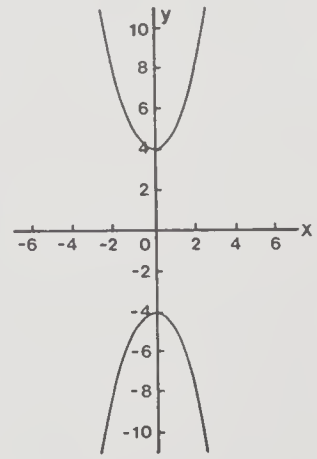
B)



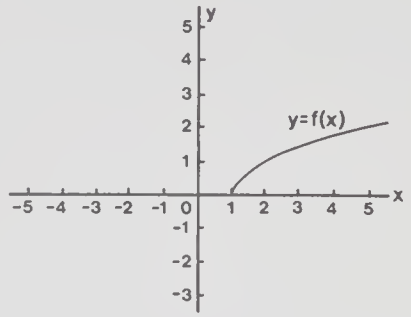
C)



D)

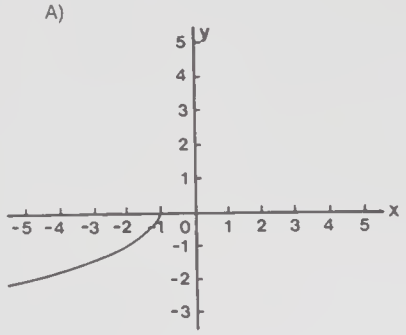


141. Examine the diagram below.

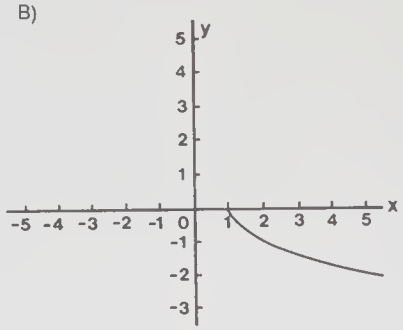


Which of the following is the graph of $y = f(-x)$?

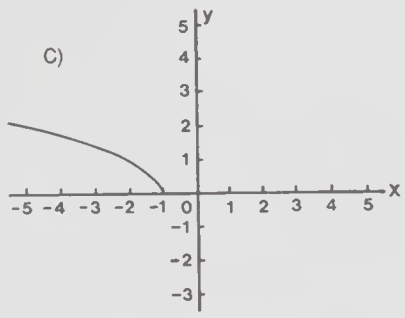
A)



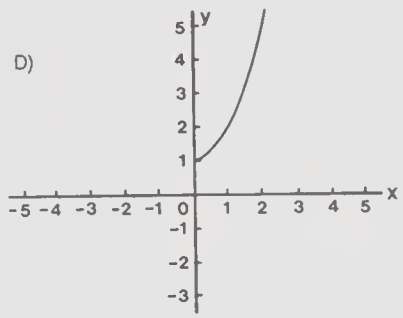
B)



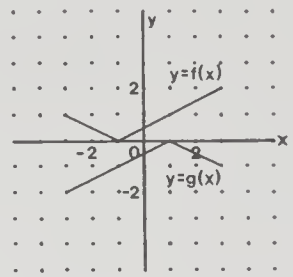
C)



D)

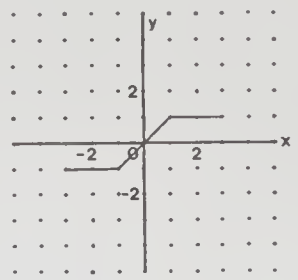


142. Examine the diagram below.

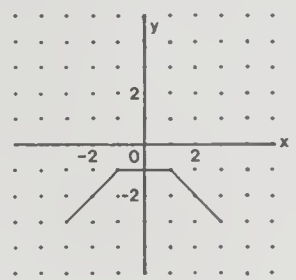


Which of the following is the graph of $y = f(x) + g(x)$?

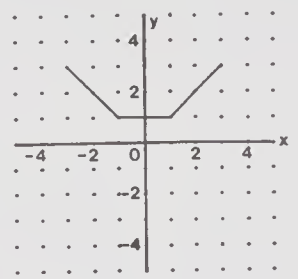
A)



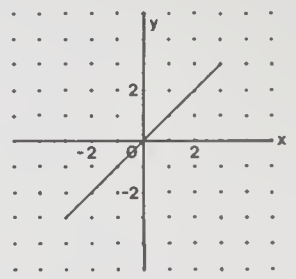
B)



C)



D)



PLACE YOUR ANSWERS IN THE SPACES PROVIDED.

143. Factor completely $4xy^2 - 12xy + 9x$.

Answer: _____

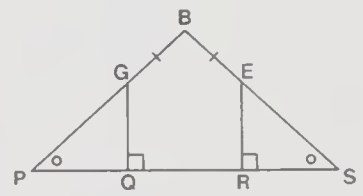
144. State the length of the radius and the coordinates of the centre of the circle defined by:

$x^2 + (y + 5)^2 = 9$

Centre: _____ Radius: _____

SHOW YOUR WORK.

145. In the diagram, below, GB = BE, $\angle P = \angle S$, GQ $\perp$ PS and ER $\perp$ PS.



Prove: GQ = ER

SCORING GUIDE: STUDENT ASSESSMENT BOOKLETS

GRADE 12 MATHEMATICS

Advanced Level

PROVINCIAL REVIEWS

MATHEMATICS

Ministry of Education
Program Implementation and
Review Branch

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DIRECTIONS

A. GENERAL INSTRUCTIONS

This four Student Assessment Booklets each contain 5 open ended questions. These may be scored correct or incorrect or they may follow a more complex scoring procedure (proofs).

Record your assessment in the area called "For Teacher's Use Only" on the back of each student's answer sheet. Be sure to record your score in the box corresponding to the booklet number the student completed. Fill in the circle next to each question number that corresponds to your assessment of the student's response.

Use an HB pencil.

B. OPEN-ENDED QUESTIONS (OTHER THAN PROOFS)

In your assessment of each student's solution to these questions, please note that some questions have several sections to score (e.g., Booklet 2, Question 24). Ensure you record a score on the answer sheet for each part of the question.

A	Did not attempt the question
B	Correct solution
C	Incorrect solution

C. PROOFS

These problems appear in Booklet 1 (Question 2%) and Booklet 4 (Question 14%). The alternatives are A to F as described on pages 5 and 17. In your assessment of each student's solution to each problem, you are required to make two judgements:

- Has the student provided a correct proof?
- Has the student used an appropriate strategy?

STUDENT ASSESSMENT BOOKLET 1

23. Factor completely $6x^2 + 25x - 9$.

Answer: $(3x - 1)(2x + 9)$

A = Did not attempt the question
B = Correct
C = Incorrect

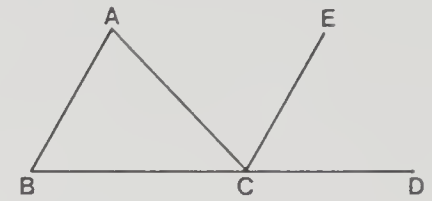
24. Evaluate $(-15)^{\frac{1}{5}}$ correct to 2 decimal places.

Answer: -1.72

A = Did not attempt the question
B = Correct
C = Incorrect

Note: Use **C** if answer is not rounded correctly to 2 decimal places.

25. Given $\triangle ABC$ with BC produced to D. EC bisects $\angle ACD$ and EC $\parallel$ AB



Prove: $\triangle ABC$ is isosceles.

Proof: EC bisects $\angle ACD$

$\therefore \quad \angle ECA = \angle ECD$

$\angle BAC = \angle ECA$ alternate angles

$\angle ABC = \angle ECD$ corresponding angles

$\angle ABC = \angle BAC$

$\therefore \quad \triangle ABC$ is isosceles

Record your judgement on the quality of the proof in the row for Question 25 on the *Mathematics Student Answer Sheet*. The alternatives are **A** through **F** as specified below:

A = Did not attempt the question.

B = Selects appropriate strategy and carries it through to produce a proof, using good form.

C = Selects appropriate strategy and carries it through to produce a proof, with error(s) in form.

D = Selects appropriate strategy, but makes a minor error.

E = Selects appropriate strategy, but makes a major logical error or does not complete the proof.

F = Attempted the question but does not show understanding that would lead to a proof.

STUDENT ASSESSMENT BOOKLET 2

63. Evaluate $17^{0.75}$ correct to 2 decimal places.

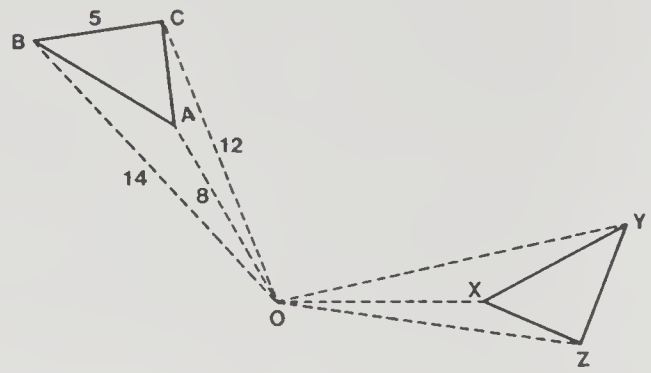
Answer: 8.37

A = Did not attempt the question
B = Correct
C = Incorrect

Note: Use **C** if answer is not rounded correctly to 2 decimal places.

64. $\triangle$ XYZ is the image of $\triangle$ ABC under a clockwise rotation of 120° about O.

BC = 5 cm, OC = 12 cm, OA = 8 cm, OB = 14 cm.



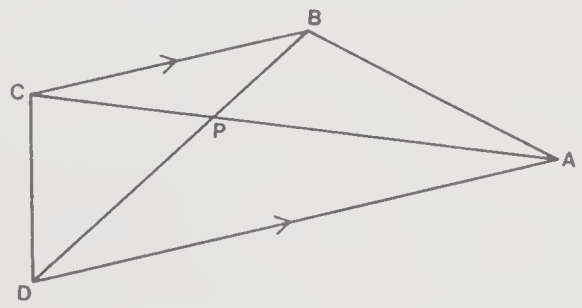
Answer (Length): The length of OZ is __12__.

A = Did not attempt the question
B = Correct
C = Incorrect

Answer (Angle): The measure of $\angle$AOX is __120°__.

A = Did not attempt the question
B = Correct
C = Incorrect

65. Given the trapezoid ABCD with AC and BD intersecting at **P**.



Prove: △ APD is similar to △ CPB.

Answer: Since BC ∥ AD
∠CBD = ∠BDA (alternate angles)
∠BCA = ∠CAD (alternate angles) OR ∠DPA = ∠CPB (opposite angles)

Hence △ APD is equiangular to △ CPB

∴ △ APD ~ △ CPB

A = Did not attempt question.

B = In your opinion, the student demonstrates knowledge of the sufficiency conditions for similar triangles.

C = In your opinion, the student does not demonstrate knowledge of the sufficiency conditions for similar triangles.

STUDENT ASSESSMENT BOOKLET 3

103. Factor completely $xy + 3x - 2y - 6$.

Answer: $(y + 3)(x - 2)$

A =	Did not attempt the question
B =	Correct
C =	Incorrect

104. What is the length of a side of a rhombus with diagonals of lengths 24 cm and 10 cm?

Answer: 13 cm

A =	Did not attempt the question
B =	Correct
C =	Incorrect

105. Solve $|x - 2| = 5$.

Answer: $x = -3$ or 7

A =	Did not attempt the question
B =	Correct
C =	Incorrect

Note: Use C if only one of the correct answers is given.

STUDENT ASSESSMENT BOOKLET 4

143. Factor completely $4xy^2 - 12xy + 9x$.

Answer: $x(2y - 3)^2$

A	=	Did not attempt the question
B	=	Correct
C	=	Incorrect

144. State the length of the radius and the coordinates of the centre of the circle defined by:

$x^2 + (y + 5)^2 = 9$

Answer (Centre): (0,–5)

A	=	Did not attempt the question
B	=	Correct
C	=	Incorrect

Answer (Radius): 3

A	=	Did not attempt the question
B	=	Correct
C	=	Incorrect

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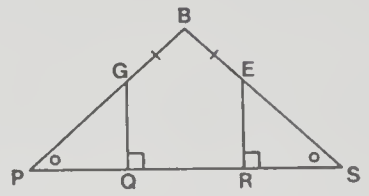
145. In the diagram below, GB = BE, $\angle P = \angle S$, GQ $\perp$ PS and ER $\perp$ PS.



Prove: GQ ≅ ER

Proof:

BP = BS

BG = BE

BP – BG = BS – BE

GP = ES

In △ PQG and △ SRE

$\angle P = \angle S$

$\angle GQP = 90° = \angle ERS$

PG = ES

$\therefore$ △ PQG ≅ △ SRE

$\therefore$ GQ = ER

Record your judgement on the quality of the proof in the row for Question 145 on the *Student Answer Sheet*. The alternatives are **A** through **F** as specified below:

A = Did not attempt the question.

B = Selects appropriate strategy and carries it through to produce a proof, using good form.

C = Selects appropriate strategy and carries it through to produce a proof, with error(s) in form.

D = Selects appropriate strategy, but makes a minor error.

E = Selects appropriate strategy, but makes a major logical error or does not complete the proof.

F = Attempted the question but does not show understanding that would lead to a proof.

PROCESS PROBLEMS

PROVINCIAL REVIEW GRADE 12 MATHEMATICS. ADVANCED LEVEL -- PROBLEM SOLVING PROCESS PROBLEM 1

NAME: BOARD:

SCHOOL: TEACHER:

Read the mathematics problem below carefully. Write your answer directly on this sheet. SHOW ALL YOUR WORK. Use the back of this page if you need more room.

Tin Jee collects basketball cards. When they are stacked in piles of 2, there is 1 left over. When they are stacked in piles of 3, there is 1 left over. With piles of 5, there are none left over. If he has fewer than 50 basketball cards, how many cards does he have?

PROVINCIAL REVIEW GRADE 12 MATHEMATICS. ADVANCED LEVEL – PROBLEM SOLVING PROCESS PROBLEM 2

NAME: BOARD:

SCHOOL: TEACHER:

Read the mathematics problem below carefully. Write your answer directly on this sheet. SHOW ALL YOUR WORK. Use the back of this page if you need more room.

On the beach during the summer Nina collected white and pink shells. One day she found 2 white shells and 1 pink shell. On the next day, she found 4 white shells and 4 pink shells, and on the third day she found 6 white shells and 7 pink shells. If this pattern continued, on what day did she find 30 more pink shells than white shells?

NAME: BOARD:

SCHOOL: TEACHER:

Read the mathematics problem below carefully. Write your answer directly on this sheet. SHOW ALL YOUR WORK. Use the back of this page if you need more room.

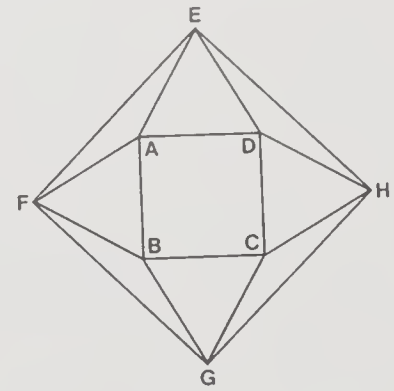
A triangle has sides of length 60 cm, 80 cm, and 100 cm. Determine the length of its shortest altitude.

NAME: BOARD:

SCHOOL: TEACHER:

Read the mathematics problem below carefully. Write your answer directly on this sheet. SHOW ALL YOUR WORK. Use the back of this page if you need more room.

ABCD is a square with sides of length 6 cm. E,F,G,H are vertices of equilateral triangles constructed on the sides of the square. Calculate the area of square EFGH, correct to the nearest square centimetre.



SCORING GUIDE: PROCESS PROBLEMS

GRADE 12 MATHEMATICS

Advanced Level

PROVINCIAL REVIEWS

MATHEMATICS

Ministry of Education
Program Implementation and
Review Branch

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DIRECTIONS

In your assessment of each student's solution to each problem, you are required to make two judgements:

- Has the student provided a satisfactory solution?
- What strategy did the student use to arrive at the solution?

1. Response

Record your judgement on the quality of the solution in the row labelled **response** for the appropriate problem number on the *Student Answer Sheet*. For all problems, the alternatives are **A** through **G** as specified in the scoring key for each problem (pages 3, 7, 11, and 18).

A

Alternative **A** is used to indicate no response.

B, C, D

Alternatives **B**, **C**, and **D** indicate that the student gave the correct answer:

B - correct answer, complete solution

C - correct answer, incomplete solution

D - correct answer, no strategy

It may be difficult to distinguish between **B** and **C** for some solutions. Only use **C** when it is very obvious that the student omitted a key component of the solution.

Alternative **D** can also be used for the situation where the student gives the correct answer and makes a few notes that are not related to a solution strategy.

E, F

Alternatives **E** and **F** indicate that the students did not give a correct answer:

E - no correct answer, reasonable strategy, minor error

F - no correct answer, reasonable strategy, major error

It may be difficult to distinguish between **E** and **F** for some solutions. For **E**, it should be obvious that the student would have obtained the correct answer if the minor error had not been made. Record **F**, if the student started a reasonable solution but did not complete it, or made some major error in reasoning part way through the solution.

G

G - no correct answer, no understanding

Use **G** if an incorrect answer is given with no work shown, or if the work shown does not show any understanding of the problem.

Mark only <u>one</u> option for a given problem.

2. Strategy

The alternatives for the descriptions of the strategies are different for each question. Please choose the <u>one</u> strategy which most closely matches the students' work and record it in the row labelled **strategy** for the appropriate problem on the *Student Answer Sheet*.

SCORING KEY - PROCESS PROBLEM 1

BASKETBALL PROBLEM

Part 1: Response

A. Did not attempt the question.

B. Completes the solution correctly using an appropriate strategy.

C. Gives the correct answer, starts an appropriate strategy, but does not complete it.

D. Gives the correct answer, but does not show reasoning/strategy.

E. Selects an appropriate strategy, but does not get correct answer due to a minor (e.g., computational) error.

F. Selects an appropriate strategy and shows understanding, but does not complete the solution or makes a major error in reasoning.

G. Attempted the question but does not show understanding that would lead to a solution.

Part 2: Strategy

A. Did not attempt the question.

B. Attempted the problem but does not show understanding that would lead to a solution.

C. Answer only, right or wrong, no work shown .

D. Searching for a pattern.

a) Piles of 2 with 1 left over
3, 5, 7, 9 ... all odd numbers

b) Piles of 3 with 1 left over
4, 7, 10, 13 ... every third number, starting with 4

c) Piles of 5 with none left over
5, 10, 15, 20, 25 ... every 5th number, start with 5

5, 15, 25 satisfy conditions a and c

condition (b) gives 4, 7, 10, 13, 16, 19, 22, **25**

25 satisfies conditions a, b, and c
He has 25 cards.

E. Constructing a table and searching for a pattern.

Number	Left Over (piles of 2)	Left Over (piles of 3)	Left Over (piles of 5)
5	1	2	0
6	0	0	1
7	1	1	2
10	0	1	0
15	1	0	0
20	0	2	0
25	1	1	0 •

• = correct response

F. Estimating (Guess and Check).

7 doesn't work
12 doesn't work
15 doesn't work
30 doesn't work
25 works

G Using a formula or writing an equation.

Piles of 2 with 1 left over
3, 5, 7 ... $3 + (n - 1)^2$

Piles af 3 with 1 left over
4, 7, 10, 13 ... $4 + (m - 1)^3$

Piles of 5 with none left aver
5, 10, 15, ... 5k

$3 + 2n - 2 = 4 + 3m - 3 = 5k$
$2n + 1 = 3m + 1 = 5k$
m, n, k ore positive whole numbers

n	m	k
2	x	1
x	3	2
7	x	3
x	x	4
12	8	5

25 is the number

H. Accounting for all possibilities.

Piles of 2 with 1 left over
3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41, 43, 45, 47, 49

Piles of 3 with 1 left over
4, 7, 10, 13, 16, 19, 22, 25, 28, 31, 34, 37, 40, 43, 46, 49

Piles of 5 with nane left over
5, 10, 15, 20, 25, 30, 35, 40, 45

25 is the only number

S. Some other strategy.

SCORING KEY - PROCESS PROBLEM 2

SHELL PROBLEM

Part 1: Response

A. Did not attempt the question.

B Completes the solution correctly using an appropriate strategy.

C. Gives the correct answer, starts an appropriate strategy, but does not complete it.

D. Gives the correct answer, but does not show reasoning/strategy.

E. Selects an appropriate strategy, but does not get correct answer due to a minor (e.g., computational) error.

F. Selects an appropriate strategy and shows understanding, but does not complete the solution or makes a major error in reasoning.

G Attempted the question but does not show understanding that would lead to a solution.

Part 2: Strategy

A. Did not attempt the question.

B. Attempted the question but does not show understanding that would lead to a solution.

C. Answer only, right or wrong, no work shown.

D. Searching for a pattern

Example:

Day	White	Pink	Difference (Pink – White)
1	2	1	–1
2	4	4	0
3	6	7	1
4	8	10	2
5	10	13	3

Difference is always 2 less than the day number.
Difference of 30 reached on 32nd day.

E. Constructing a table.

As for D above, but table completed to 32nd day.

Day	White	Pink	Difference (Pink – White)
1	2	1	–1
2	4	4	0
3	6	7	1
4	8	10	2
5	10	13	3
6	12	16	4
7	14	19	5
8	16	22	6
9	18	25	7
10	20	28	8
11	22	31	9
12	24	34	10
13	26	37	11
14	28	40	12
15	30	43	13
16	32	46	14
17	34	49	15
18	36	52	16
19	38	55	17
20	40	58	18
21	42	61	19
22	44	64	20
23	46	67	21
24	48	70	22
25	50	73	23
26	52	76	24
27	54	79	25
28	56	82	26
29	58	85	27
30	60	88	28
31	62	91	29
32	64	94	30

F. Using a formula or writing an equation.

On the nth day Nina collected 2n white shells and 1 + 3(n – 1), or 3n – 2 pink shells

For 30 more pink shells than white shells: $3n - 2 - 2n = 30$
$n = 32$

S. Some other strategy.

SCORING KEY - PROCESS PROBLEM 3

SHORTEST ALTITUDE PROBLEM

Part 1: Response

A. Did not attempt the question.

8. Completes the solution correctly using an oppropriate strotegy.

C. Gives the correct onswer, storts an appropriote strategy, but does not complete it.

D. Gives the correct onswer, but does not show reosoning/strategy.

E. Selects an appropriate strotegy, but does not get correct answer due to o minor (e.g., computationol) error.

F. Selects an appropriote strotegy and shows understanding, but does not complete the solution or mokes o major error in reasoning.

G. Attempted the question but does not show understanding thot would lead to o solution.

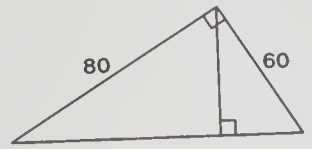
Part 2: Strategy

A. Did not attempt the question.

8. Attempted the question but does not show understanding that wauld lead to a solution.

C. Answer only, right or wrong, no work shawn.

D. Estimating (Guess and Check).



Altitude 40

$\sqrt{60^2 - 40^2} = 44.7$

$\sqrt{80^2 - 40^2} = \underline{69.3}$

$\underline{114.0} > 100$ x

Altitude 50

$\sqrt{60^2 - 50^2} = 33.1$

$\sqrt{80^2 - 50^2} = \underline{62.4}$

$\underline{95.5} < 100$ x

Altitude 49

$\sqrt{60^2 - 49^2} = 34.7$

$\sqrt{80^2 - 49^2} = \underline{63.2}$

$\underline{97.9} < 100$ x

Altitude 48

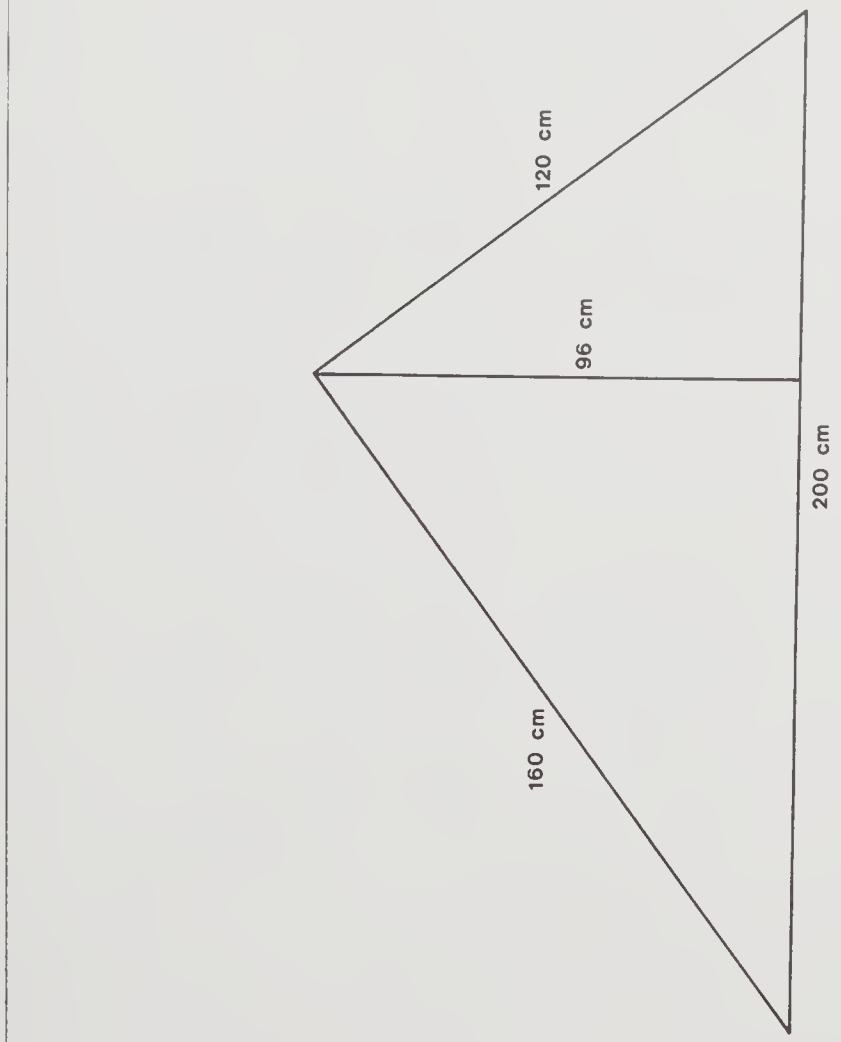
$\sqrt{60^2 - 48^2} = 36$

$\sqrt{80^2 - 48^2} = \underline{64}$

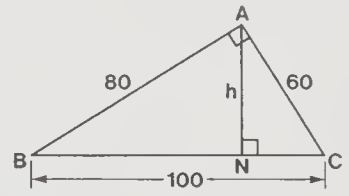
$\underline{100}$ ✓

The shortest altitude is 48 cm.

E. Drawing a scale diagram.



F. Using similar triangles.



Δ ABN ~ Δ CBA

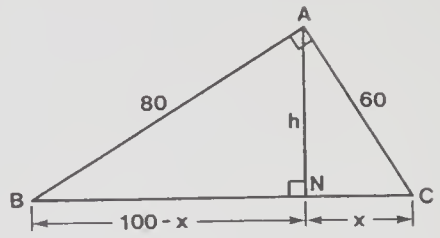
$$\frac{AB}{AN} = \frac{CB}{CA}$$

$$\frac{80}{h} = \frac{100}{60}$$

$$h = \frac{80 \times 60}{100} = 48$$

The shortest altitude is 48 cm.

G. Using a farmula - Thearem af Pythagaras



Δ ABN:

$h^2 = 80^2 - (100 - x)^2$

Δ ANC:

$h^2 = 60^2 - x^2$

$60^2 - x^2 = 80^2 - (100 - x)^2$

$3600 - x^2 = 6400 - 10\,000 + 200x - x^2$

$7200 = 200x$

$36 = x$

Δ ANC:

$h^2 = 60^2 - 36^2$

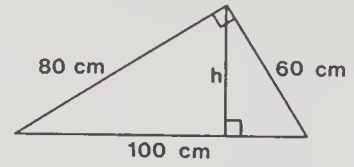
$= 3600 - 1296$

$= 2304$

$h = 48$

The shartest altitude is 48 cm.

H. Using a farmula - Area of a triangle.



Area of Δ in cm^2 :

$A = \frac{1}{2}bh$

$= \frac{1}{2}(60)(80)$

$= 2400$

ar

$A = \frac{1}{2}(100)h$

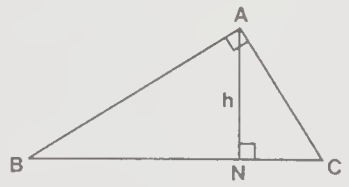
$= 50h$

$50h = 2400$

$h = 48$

The shartest altitude is 48 cm.

I. Using a formula - Triganometry.



From Δ ABC, $\tan B = \frac{60}{80}$ or From Δ ABC, $\sin C = 0.08$

$C = 53.130°$

$= 0.75$

$B = 36.869897°$

From Δ ABN, $\sin B = \frac{h}{80}$ or From Δ ABN, $\sin C = \frac{h}{60}$

$h = 80 \sin B$ $h = 60 \sin C$

$= 48$ $= 48$

Shortest altitude is 48 cm. Shortest altitude is 48 cm.

Acceptable: 47.9 cm or 48.1 cm

S. Same other strategy

SCORING KEY - PROCESS PROBLEM 4

SQUARE PROBLEM

Part 1: Response

A. Did not attempt the question.

B. Completes the solution correctly and selects an appropriate strategy.

C. Gives the correct answer, starts an appropriate strategy, but does not accept it.

D. Gives the correct answer, but does not show reasoning/strategy.

E. Selects an appropriate strategy, but does not get correct answer due to a minor (e.g , computational) error.

F. Selects an appropriate strategy and shows understanding, but does not complete the solution or makes a major error in reasoning.

G. Attempted the question but does not show understanding that would lead to a solution.

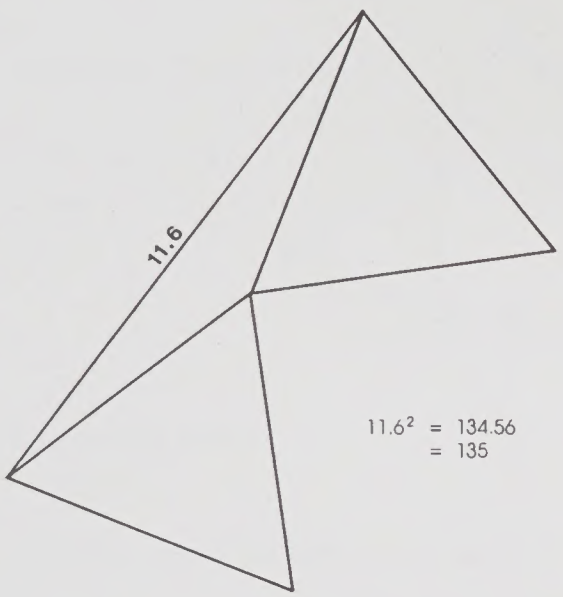
Part 2: Strategy

A. Did not attempt question.

B. Attempted the question but does not show understanding that would lead to a solution.

C. Answer only, right or wrong, no work shown.

D. Drawing an accurate diagram.



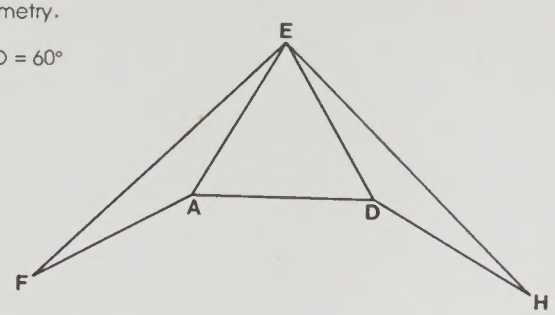
$11.6^2 = 134.56$
$= 135$

Area = 135 cm^2

E. Using a formula - Trigonometry.

$\angle FEH = 90°$ and $\angle AED = 60°$

$\angle FEA = 15°$
$\angle EFA = 15°$
$\angle FAE = 150°$



Applying the Cosine Law to Δ FEA or Applying the Sine Law to Δ FEA

$FE^2 = AE^2 + AF^2 - 2AE \times AF \cos A$
$= 36 + 36 - 2 \times 6 \times 6 \cos 150°$
$= 72 - 72 \cos 150°$

$= 134$

$\frac{FE}{\sin 150°} = \frac{6}{\sin 15°}$

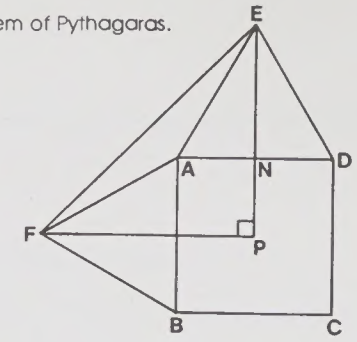
$FE = 11.6$

or Using definition of cosine

$FE = 2\,(6) \cos 15°$
$= 11.6$

Area of EFGH is 134 cm^2 (to nearest square centimetre)

F. Using a formula - Theorem of Pythagoras.



From Δ EAN:

$EN = \sqrt{36-9} = \sqrt{27}$

$\therefore \quad EP = 3 + \sqrt{27}$ and $FP = 3 + \sqrt{27}$

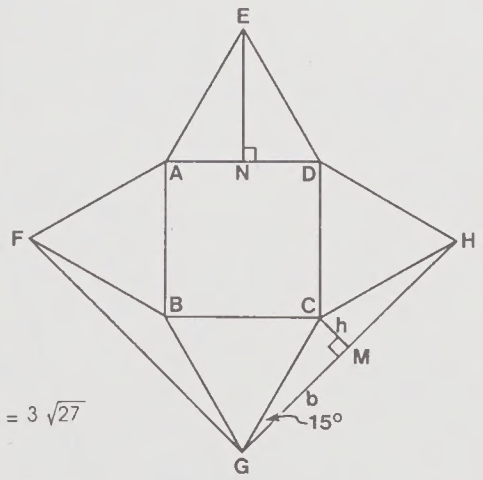
Area of square EFGH = 4 x area of Δ EFP

$= 4\left(\frac{1}{2}\right)(3 + \sqrt{27})^2$

$= 134$

Area af EFGH is 134 cm^2 (ta nearest square centimetre)

G. Salving a simpler problem.



In Δ AEN,

EN = $\sqrt{36-9} = \sqrt{27}$

Area af Δ AED = $\frac{1}{2}(6\sqrt{27}) = 3\sqrt{27}$

∠FGH = 90° and ∠BGC = 60°

∠FGB = ∠CGH = 15°

CM = 6 sin 16°
GM = 6 cos 15°

Area of Δ GCM = $\frac{1}{2}$(6 cos 15°)(6 sin 15°)

= 18 cas 15° sin 15°

Area of square EFGH

= area af square ABCD + 4 × area af Δ ACD + 8 x area of Δ GCM

$= 36 + 4 \times 3\sqrt{27} + 8 \times 18 \cos 15° \sin 15°$

= 134

Area af square EFGH is 134 cm^2 (to nearest square centimetre)

S. Some ather strategy.

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